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ORIGINAL ARTICLES.

THE DISINFECTION OF ROOMS.[1]

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THE thorough disinfection of rooms and their contents, infected with disease-producing organisms, constitutes one of the chief means for the prevention of the spread of disease. The methods which aim to accomplish this result must stand the test of a thorough laboratory trial. It may be that the requirements exacted in the laboratory are more severe than those which occur in actual experience, and yet the results of experiment form the only safe guide as to the powers of any given agent. The laboratory can alone decide how much of the disinfectant is to be used, the length of time it is to act, the influence of the presence or absence of moisture, and how the contents of the room are to be arranged in order to insure disinfection. It is not sufficient to pile the bedding and clothing in one or more heaps upon the floor, to burn three or more pounds of sulphur during a few hours, and then assume that everything has been done that can be done. The proper disinfection of a room is a most delicate experiment and should be entered upon with full knowledge of the various conditions which are necessary to success.

There is no chemic disinfectant which will invariably yield the same result regardless of the organism to be acted upon and the surroundings or environment of that organism. Thus, while a mercuric-chlorid solution may destroy the cholera vibrio within a few seconds, it does not follow that it will also destroy anthrax spores. Again, the anthrax spores in water suspension will be destroyed by this agent much more rapidly than if suspended in a highly albuminous fluid such as blood. These and similar conditions are equally true for gaseous disinfectants. A gaseous disinfectant, even the most efficient, may fail simply because it is expected to accomplish too much. We may ridicule the attempt at disinfection of a privy-vault or cesspool by means of a few pounds of copperas, although this is no more absurd than many a so-called room disinfection. This or that gaseous agent is said to lack the power of penetration, and to be a mere "surface disinfectant." The latter property is an excellent one and constitutes about all that can be expected of any gas. While it is true that a gaseous disinfectant possesses little penetrating power, that is to say, it will not go through several mattresses or bundles of blankets, it should be remembered that this a deficiency which can easily be remedied if the disinfector will properly do his share of the work.

Sulphur fumigation is extensively employed for the purpose of room disinfection. Many doubts have been cast upon its efficiency, largely, perhaps, because it was expected to do too much. The causes of certain diseases, such as scarlet fever, measles, and smallpox, are still unknown, and it is purely gratuitous to assume that because sulphur fumes do not kill anthrax spores and other resistant organisms they are of no value for disinfection in such diseases as those mentioned above. The organisms which produce these diseases are probably as easily destroyed as those of cholera, diphtheria, and the black-plague. The Michigan State Board of Health, through its efficient secretary, Dr. Henry B. Baker, has always warmly advocated sulphur fumigation. When this method is properly applied there can be no doubt, as may be seen from the experiments to be related, of its efficiency in restricting the spread of certain infectious diseases.

Within the past few years formaldehyd has attracted considerable attention as a disinfectant. Various forms of apparatus have been devised for its generation and employment. In view of the strong claims for this agent and the grave doubts cast upon the efficiency of sulphur dioxid, it was thought desirable to make a comparative study of their usefulness. This investigation was undertaken largely at the request of the Michigan State Board of Health, and it is hoped that the results obtained will be directly useful to health-officers, physicians, etc., in this and other States. The report covers twenty-six distinct room-disinfection experiments. The number of specimens exposed to the action of disinfectants and then inoculated into culture-media exceeds 5000. It will be evident from these facts that the utmost care, regardless of time, was taken in order to insure practical results.

[1] A report to the Michigan State Board of Health, read at a meeting of the Michigan State Medical Society, held at Detroit, May 6, 1898.

The room employed for all but one of these experiments was especially suitable for the object in view. It was designed as a disinfection-room at the time the laboratory was constructed and it was intended to have a capacity of 1000 cubic feet. It really contains 1016 cubic feet (28.8 cubic meters). In order to make the room perfectly tight the cracks in the edge of the ceiling and in the corners of the room were filled with plaster of Paris. The plaster ceiling and walls were then coated with calcimine and glue and finally given a coat of paint. It should be said that two of the walls were brick and these were not painted. The spaces between the plaster and wash-boards, door, and window-frames were caulked with putty, as were also the spaces around the door and window on the outside of the room. The ventilator and waste-pipe opening into the room were tightly plugged. During the disinfection the cracks about the door were securely closed by caulking with strips of muslin. The room thus prepared was probably as gas-tight as possible. In the case of the formalin experiments there was no odor in the adjoining rooms, in which students were constantly at work. In sulphur fumigations the gas was at times noticeable in the adjoining room. This, it may be incidentally mentioned, is one disadvantage of sulphur as compared with formaldehyd. The latter does not tend to pass out of the room, unless, of course, gross cracks or openings exist; whereas, sulphur dioxid will always find an opening be it ever so small. Where the adjoining rooms are inhabited, as in crowded tenement-houses, formaldehyd possesses a distinct advantage over sulphur.

Twenty different organisms were exposed to the action of the disinfectant. The first six, as given in the tables, contained spores. These were the germs of anthrax, symptomatic anthrax, tetanus, and malignant edema, as well as the hay and potato bacillus. With the exception of the three anaerobic germs and the tubercle bacillus, the other organisms, sixteen in number, were grown on inclined agar at a temperature of 39° C. (102.2° F.). By means of a sterile pipette sterile bouillon (3 to 4 c.c.), about one dram was added to each agar culture. The growth was thoroughly whipped up and then pipetted off into a sterile Esmarch dish. The suspensions thus obtained were exceedingly rich in bacteria.

The spores of anthrax were very abundant and were obtained by growing the germs during several days on peptonless agar at a temperature of 39° C. (102.2° F.). The cultures of the hay and potato bacilli were likewise several days old and rich in spores. The three anaerobic organisms, those of malignant edema, symptomatic anthrax, and tetanus were grown in glucose bouillon in hydrogen for five to six days. The sediment, consisting chiefly of spores, was carefully drawn off by means of a sterile pipette with as little dilution as possible.

The names Sanarelli and Havelburg refer to the bacteria described by these men as the cause of yellow fever. The psittacosis bacillus is the etiologic factor in a parrot disease which is apparently communicable to man. The pus-producing bacteria are represented by the staphylococcus pyogenes aureus, streptococcus pyogenes and the bacillus of green pus.

Sputum containing many tubercle bacilli was employed in preference to pure cultures of this organism. The experiments with tubercle bacilli were not numerous but were very conclusive. After exposure in Esmarch dishes to the action of the disinfectant the tuberculous material was rubbed up with sterile bouillon and injected intraperitoneally into guinea-pigs.

Sterile silk threads, bits of muslin and cover-glasses were employed in these tests. The silk threads were about 1½ cm. (¾ inch) long. The bits of muslin were about 1 cm. (⅓ inch) square. Cleaned cover-glasses 20 mm. square were cut into halves and sterilized. The letters S. M. and G. in the tables refer to silk, muslin, and cover-glasses respectively.

The threads and muslin squares were thoroughly soaked in the bacterial suspension prepared as mentioned above. Care was taken to spread out each piece of muslin; eventually each piece was turned over so as to insure thorough soaking. The impregnated threads and muslins were then transferred to sterile Esmarch dishes. The cover-glasses were smeared, on one side only, with a large loop full of the bacterial suspension.

One set of specimens thus prepared was exposed during two and one-half to three hours at a temperature of 39° C. (102.2° F.) to dry. In order to insure drying the tops of the Esmarch dishes were left slightly ajar. Occasionally a muslin would not be completely dry in this time, and hence, when exposed to the disinfectant, was in reality a moist specimen, and as such would be readily disinfected. When dry the specimens were taken out of the incubator, and each piece of silk and muslin carefully loosened from the dish in order that the gas might act on all sides.

The second set of specimens, in order to prevent drying during the time that the first was undergoing desiccation, were placed in moist chambers. In spite of this precaution some specimens would become dry before the disinfectant had time to act, and in such cases the specimen became as resistant as a dry one. As might be expected, the cover-glass would

be the first to dry, then the silk threads. When about to begin a disinfection both wet and dry sets were placed on a table in the room, and the tops of the Esmarch dishes were slipped to one side. The specimens were, therefore, in open dishes. Except in the case of the sulphur experiments there were no dishes of water in the room.

At the close of the disinfection period the tops were rapidly replaced and the dishes then taken out of the room. Each specimen was transferred to a tube of bouillon. A sterile forcep was used for each specimen. The fifteen tubes of each anaerobic set were placed together in a Novy bottle, and hydrogen was passed through for from one to two hours. All the bouillon tubes thus inoculated were exposed to a temperature of 35° C. (95° F.) for from five to seven days, when they were examined and the results noted. As a result of careful, rapid work contaminations were exceedingly rare. Frequently an entire set of two or three hundred tubes would not show a single contamination.

In the tables "+" indicates that a growth had formed; on the other hand, "O" indicates that the tube remained sterile. It should be stated that frequently the growth when present was very slight, showing that marked attenuation of the germ had occurred as a result of the exposure. The specimens were invariably exposed in duplicate. Another set was kept in a cool, dark place for the same length of time as the exposed objects. These controls were then planted into bouillon at the same time as the exposed specimens.

TABLE I.—SULPHUR DISINFECTION.

Amount used.		Three pounds.			Six pounds.		
Condition.		Dry.	Wet.	Control.	Dry.	Wet.	Control.
Anthrax.	S.	+	+ +	+	+	+ +	+
	M.	+	+ +	+	+	+ O	+
	G.	+	+ O	+	O	O +	O +
Symptomatic anthrax.	S.	+	+ +	+	+	+ +	+
	M	+	+ +	+	+	+ +	+
	G.	+	+ +	+	+	+ +	+
Malignant edema.	S.	+	+ +	+	+	+ +	+
	M.	+	+ O	+	+	+ +	+
	G.	+	+ +	+	O	O +	O +
Tetanus.	S.	+	+ +	+	+	+ +	+
	M.	+	+ +	+	+	+ +	+
	G.	+	+ +	+	+	+ O	O +
Hay bacillus.	S.	+	+ +	+	+	+ +	O +
	M.	+	+ +	+	+	+ +	O +
	G.	+	O O	O +	O	O O	O +
Potato bacillus.	S.	+	+ +	+	+	+ +	+ +
	M.	+	+ +	+	+	+ +	+ +
	G.	+	+ +	+	+	+ +	O +
Cholera.	S.	O	O O	O O	O	O O	O +
	M.	O	O O	O O	O	O O	O +
	G.	O	O O	O O	O	O O	O O
Diphtheria.	S.	+	+ O	O +	O	O O	O +
	M.	+	+ O	O +	O	O O	O +
	G.	O	O O	O +	O	O O	O +
Glanders.	S.	O	O O	O +	O	O O	O +
	M.	O	O O	O +	O	O O	O +
	G.	O	O O	O O	O	O O	O O
Typhoid fever.	S	+	+ O	O +	+	+ O	O +
	M.	+	+ O	O +	+	+ O	O +
	G.	O	O O	O +	O	O O	O +
Colon bacillus.	S.	+	+ O	O +	+	+ O	O +
	M.	+	+ O	O +	+	+ O	O +
	G.	+	O O	O +	O	O O	O +
Sanarelli.	S.	+	+ O	O +	+	+ O	O +
	M.	+	+ O	O +	+	+ O	O +
	G.	+	O O	O +	O	O O	O +
Havelburg.	S.	+	+ O	O +	+	+ O	O +
	M.	O	O O	O +	+	+ O	O +
	G	O	O O	O +	O	O O	O +
Psittacosis.	S.	+	+ O	O +	+	O O	O +
	M.	+	+ O	O +	+	+ O	O +
	G.	+	+ O	O +	O	O O	O +
Black plague.	S.	O	O O	O O	O	O O	O +
	M.	O	O O	O O	O	O O	O +
	G	O	O O	O +	O	O O	O +
Staphylococcus pyo. aur.	S.	+	+ O	O +	+	+ O	O +
	M.	+	+ O	O +	+	+ O	O +
	G.	+	+ O	O +	+	O O	O +
Pneumonia (Fraenkel).	S.	O	O O	O +	+	O O	O +
	M.	O	O O	O +	+	O O	O +
	G.	O	O O	O +	O	O O	O +
Green pus.	S.	+	+ O	O +	+	+ O	O +
	M.	+	+ O	O +	+	+ O	O +
	G.	+	+ O	O +	O	O O	O +
Streptococcus pyogenes.	S.	+	+ O	O +	+	+ O	O +
	M.	+	+ O	O +	+	+ O	O +
	G.	+	+ O	O +	O	O O	O +
Tuberculosis (see text).							
Total positive growths.[1]		79	32	51	64	24	55
Deducting hay bacillus.		74	28	48	60	24	52

[1] The total number of specimens exposed, in each column, was 114; the controls in each column number 57.

SULPHUR EXPERIMENTS.

In these experiments the sulphur was placed in one or two iron water-baths on tripods which stood in shallow basins of water; 50 c.c. (1⅔ fl. oz.) or more of alcohol was added to each three-pound portion of sulphur, and then set on fire. The sulphur would burn three or four hours, and, as previously stated, some sulphur fumes would penetrate into the adjoining room in spite of the utmost precautions in closing up openings. The time of exposure was twenty hours. At the end of this time the room was entered and the articles were removed. When but three pounds of sulphur was used the air in the room at the end of that period was irritating, but tolerable; whereas, with six pounds of sulphur it was well nigh insupportable. The glass dishes, especially when six pounds of sulphur was employed, were coated with a white film, due to finely divided sulphur. On account of the presence of sulphurous acid the reaction of this deposit was intensely acid.

A maximum and minimum thermometer was placed in the room during each experiment. In the experiment with three pounds of sulphur the temperature varied from 19° to 28° C. (66.2° to 82.4° F.); while in that with six pounds it registered 16° to 29° C. (60.8° to 84.2° F.).

The exposed objects, as a rule perfectly dry when taken out, were planted directly into bouillon. The

amount of sulphur dioxid adherent to the specimens was not sufficient to act as an antiseptic and inhibit the growth of the organisms, if any life was present. The absence of such inhibiting action was ascertained by repeated and prolonged washing of the specimens of one set in slightly warmed sterile water. No difference was observed between washed and unwashed specimens, and hence, in most of the experiments, the washing was omitted.

The suspensions used for the exposures in Table I. were the same as those used in the paraform experiments (Table II.). In order to prevent growth and consequent alteration of the suspension, they were kept in a jar immersed in melting ice. The results given in Tables I. and II. are, therefore, strictly comparable, since they were obtained with the same suspensions.

An inspection of Table I. will show what sulphur fumigation is capable of doing. In the first place, it will be seen that the dry specimens, as compared with the wet ones, are much more resistant to destruction. Furthermore, it will be seen that all the wet specimens were killed except those containing spores and tubercle bacilli. Sulphur, even in six-pound portions, cannot be used to destroy spores or tubercle bacilli. A comparison of this table with the one following will show that formaldehyd readily destroys wet spores and tubercle bacilli, and this fact demonstrates the relative superiority of formalin over sulphur. In actual practice the physician is not called upon, however, to destroy spores. With the exception of the tubercle bacillus only vegetating, actively growing, and weak forms of bacteria have to be destroyed. It will be noticed that the micro-organisms of cholera, glanders, diphtheria, black-plague, and pneumonia are quite readily destroyed by sulphur.

With reference to the cholera vibrio it should be noted that even the control-tubes fail to develop. This organism is extremely weak, and mere desiccation for twenty-four hours usually suffices to destroy it. The bacillus of black or bubonic plague is almost as weak as the cholera vibrio.

Six pounds of sulphur are somewhat more destructive than three pounds. This is seen in the larger number of dried specimens which failed to develop after employment of the larger quantity. Out of 114 dry specimens only 64 gave a growth when six pounds of sulphur was burned; whereas, with three pounds of sulphur 79 specimens survived. As a rule, the cover-glass specimens were the first to die out. As stated before, the suspensions were spread only upon the upper surface of the cover-glasses, and this true surface distribution explains the fact mentioned.

If there is a considerable escape of sulphur fumes into the surrounding rooms the results are by no means as certain as those indicated above. Even the wet specimens of the germs of cholera, glanders, diphtheria, and typhoid fever may not be destroyed in such cases.

In order, then, to insure destruction of vegetating bacteria by means of sulphur fumes, it is necessary that these shall be in *direct contact with water*. It is not sufficient to have several pans of water in the room or to inject steam in order to saturate the atmosphere with aqueous vapor. In some experiments one liter of water was distilled into the room in which six pounds of sulphur was being burned. The previously dried specimens were not affected any more than if no steam had been introduced.

No experiments were made with sulphur fumigations for a shorter period than twenty hours. It is highly probable that exposures for from three to six hours, as practised in some cities, are not sufficient to destroy even wet specimens. In the *Biennial Report of the Department of Health of Chicago*, published in 1897 (pp. 85 and 250), a procedure is described which is intended to test the efficiency of sulphur fumigation. Inclined agar tubes are inoculated with the potato or hay bacillus (spores), and then exposed to the sulphur fumes in the room undergoing disinfection. The tubes are then taken to the laboratory and allowed to develop in the incubator, but more usually at the room temperature. If no growth develops the conclusion is drawn that potato or hay bacillus spores have been destroyed, and since these possess a marked resistance it is further assumed that the disinfection of the room itself has been thorough.

As a matter of fact, the control-test as outlined above is fallacious, for the simple reason that enough sulphur dioxid is taken up by the agar to act as an antiseptic but not as a germicide. Agar tubes prepared as above and exposed for twenty hours to the fumes from six pounds of sulphur are not disinfected. The agar becomes milky or opaque white in color, and becomes intensely acid on account of the presence of sulphurous acid. These tubes when placed in the incubator will invariably fail to develop, not because the spores are dead, but because their growth is inhibited by the presence of an antiseptic. If some of the material on the surface of such agar tubes is transplanted to a fresh agar tube, growth will invariably result.

This method of testing the efficiency of fumigation is therefore not to be relied upon. Moreover, the spores of the potato bacillus are vastly more resistant, as seen from the accompanying tables, than any of the common disease-producing organisms. This

test, it may be added, is inapplicable even in formalin disinfection. One hundred and twenty grams of paraform volatilized in a room of 1000 cubic feet (4 gm. per cubic meter or 60 grs. per cubic yard) is not sufficient to disinfect agar tubes which have been inoculated with the two organisms mentioned. These tubes when placed in the incubator promptly develop, and if after the exposure transplantations are made to fresh agar tubes the growth will be perfectly normal. This result with agar streaks will be obtained even when most of the silk, muslin, and cover-glass specimens are destroyed.

Tubercle bacilli are known to possess considerable resistance, and this characteristic is well demonstrated in connection with sulphur fumigation. A specimen of sputum rich in tubercle bacilli was divided into three equal portions. These were placed in sterile Esmarch dishes. One of the dishes was exposed uncovered during twenty hours in a room where 6 pounds of sulphur was burned. Another dish was exposed the same length of time in the room in which 120 grams (4 oz.) of paraform was volatilized. After the exposure the contents of the dishes were still moist. Bouillon, however, was added to each dish, and the contents were then thoroughly stirred up and injected intraperitoneally into two guinea-pigs. The third portion of sputum was not exposed to a disinfectant but was injected into a guinea-pig as a control-test. The control guinea-pig died within fourteen days. The guinea-pig that received the sputum which had been exposed to sulphur fumes died within fifteen days. Both of these animals showed typical experimental tuberculosis. The guinea-pig that received the sputum which was exposed to formalin vapors was killed a month later and on examination was found to be absolutely free from tuberculosis. Sulphur fumigation is therefore of no value in destroying tubercle bacilli and hence, should not be depended upon in the disinfection of tuberculous material.

The sulphur experiments can be summarized as follows:

Sulphur fumes possess little or no action on most bacteria when in the dry state. If, however, the specimens are actually wet they will be destroyed except in the case of resistant forms such as the spore stage and tubercle bacilli. Sulphur is of no value in the disinfection of wet or dry spore-containing material, or of tubercle bacilli. It can be used for the disinfection of rooms which have been infected with ordinary disease organisms. To insure good results in these cases, from 3 to 6 pounds of sulphur must be burned for each 1000 cubic feet of space. The walls, floor, and articles in the room should be sprayed with water. The room should be made perfectly tight, and should be kept closed at least 20 hours.

PARAFORM DISINFECTION.

Schering's disinfector and paraform pastils were employed in these experiments. Paraform, or para-

TABLE II.—PARAFORM DISINFECTION.

Amount used.		60 grams.			120 grams.		
Condition.		Dry.	Wet.	Control.	Dry.	Wet.	Control.
Anthrax.	S.	+	O	+	+	+	+
	M.	+	O	+	+	O	+
	G.	+	+	+	+	+	+
Symptomatic anthrax.	S.	+	O	+	+	O	+
	M.	+	O	+	+	O	+
	G.	+	O	+	+	O	+
Malignant edema.	S.	+	O	+	+	O	+
	M.	O	O	+	+	O	+
	G.	+	O	+	+	O	+
Tetanus.	S.	+	O	+	+	O	+
	M.	+	O	+	+	O	+
	G.	+	O	+	+	O	+
Hay bacillus.	S.	+	O	+	+	O	+
	M.	+	O	+	+	O	+
	G.	+	O	+	O	O	+
Potato bacillus.	S.	+	O	+	+	O	+
	M.	+	O	+	+	O	+
	G.	+	O	+	+	O	+
Cholera.	S.	O	O	O	O	O	O
	M.	O	O	O	O	O	O
	G.	O	O	O	O	O	O
Diphtheria.	S.	O	O	+	+	O	+
	M.	+	O	+	O	O	+
	G.	O	O	+	O	O	+
Glanders.	S.	+	O	+	+	O	+
	M.	O	O	+	O	O	+
	G.	O	O	+	O	O	+
Typhoid fever.	S.	+	O	+	+	O	+
	M.	+	O	+	+	O	+
	G.	+	O	+	+	O	+
Colon bacillus.	S.	+	O	+	+	O	+
	M.	+	O	+	+	O	+
	G.	O	O	+	+	+	+
Sanarelli.	S.	+	O	+	+	O	+
	M.	+	O	+	+	O	+
	G.	+	+	+	+	O	+
Havelburg.	S.	+	O	+	+	O	+
	M.	+	O	+	+	O	+
	G.	+	+	+	+	+	+
Psittacosis.	S.	+	O	+	+	O	+
	M.	+	O	+	+	O	+
	G.	+	O	+	+	+	+
Black plague.	S.	O	O	+	+	O	+
	M.	O	O	+	O	O	+
	G.	O	O	+	O	O	+
Staphylococcus pyo. aur.	S.	+	O	+	+	O	+
	M.	+	O	+	+	O	+
	G.	+	O	+	+	O	+
Pneumonia (Fraenkel).	S.	+	O	+	+	O	+
	M.	+	O	+	+	O	+
	G.	+	O	+	O	O	+
Green pus.	S.	+	O	+	+	O	+
	M.	+	O	+	+	O	+
	G.	+	O	+	O	+	+
Streptococcus pyogenes.	S.	+	O	+	+	+	+
	M.	+	O	+	+	O	+
	G.	+	O	+	+	O	+
Tuberculosis (see text under sulphur).							
Total positive growths.[1]		82	3	54	83	9	54
Deducting hay bacillus.		77	3	51	80	9	51

[1] See footnote to Table I.

formaldehyd is a polymerized formaldehyd. On gentle heating it breaks up and regenerates formaldehyd. The gas thus produced will remain in this condition if moisture is present in the atmosphere. In the absence of moisture the gaseous formaldehyd will repolymerize and hence will cease to be effective as a disinfectant. With Schering's disinfector it is maintained that sufficient water is formed by the burning alcohol to prevent this repolymerization. Owing to the great solubility of formaldehyd large vessels of water should not be kept in the room to be disinfected. When water is thus kept in the room scarcely any odor of formalin will remain in the room at the end of twenty hours, whereas in the absence of such water the odor at the end of the time mentioned will be intolerable. In the tabulated experiments with paraform and with formalin no vessels of water were allowed in the room.

The maximum and minimum thermometer in the room indicated a temperature of 23° to 27° C. (72.4° to 80.6° F.) in the experiment with 60 grams (2 oz.) of paraform, and a temperature of 19° to 28° C. (66.2° to 82.4° F.) in the experiments with 120 grams (4 oz.) of paraform.

Sixty grams of paraform for 1016 cubic feet corresponds to a little over 2 grams per cubic meter of air space. One hundred and twenty grams of paraform, therefore, represents a little over 4 grams per cubic meter. Two hundred to 300 cubic centimeters of alcohol were used in order to volatilize the paraform.

As stated under sulphur fumigation, the same suspensions were used for the tabulated paraform and sulphur experiments. From these suspensions, kept at the temperature of melting ice, the necessary silk thread, muslin square, and cover-glass specimens were prepared each day in the manner already described.

The exposed specimens were, as a rule, transferred directly to bouillon. In some cases they were previously washed with dilute sterile ammonium hydrate in order to neutralize any trace of disinfectant, but the results were in no wise different from those obtained with unwashed specimens.

A study of Table II. will show the same difference between wet and dry specimens as has been pointed out under sulphur. There is this striking difference, however, that wet spore material is thoroughly disinfected with formaldehyd, whereas such material is not affected by sulphur. Formaldehyd is, therefore, a more energetic disinfectant.

Practically all of the wet specimens were destroyed. It will be noticed, however, that 120 grams of paraform do not possess a greater action than 60 grams. Indeed, the results were not so good. It is possible that several of the wet specimens dried out before sufficient formalin was generated, and hence they acquired the resistance of dried specimens. As might be expected the cover-glass preparations would be the first to dry out, the silk thread next, and last of all the muslin squares. Of the nine positive growths seven were from cover-glasses and two from silk threads. In the first set all three of the survivals of the wet set were cover-glass preparations.

It will be further noticed that the weak disease-producing organisms, such as the germs of cholera, black plague, glanders, diphtheria, etc., are nearly all destroyed even in the dry state. Tubercle bacilli when in a wet condition are readily destroyed by formaldehyd vapors. Here, as in the case of spore destruction, is seen the superiority of formaldehyd vapor over sulphur fumes. The experiment in disinfection of tuberculous sputum has been described in connection with the sulphur experiments.

The results obtained with Schering's disinfector may be briefly summarized as follows:

Sixty grams of paraform pastils per 1000 cubic feet of space are sufficient to destroy within twenty hours all organisms regardless of whether they are present as spore or vegetating forms, *provided they are wet.* It is not sufficient to inject steam into the room. At least steam generated from one liter of water and injected into the room containing dry specimens will not alter the results. The walls and floor of the room, and whatever articles are present (previously spread out as much as possible) should be thoroughly sprayed with water before exposure to the formalin vapors.

FORMALIN DISTILLATION.

In Table III. are given the results obtained in the first trials with distillation of formalin. Formalin solutions on heating are said to readily polymerize, giving rise to paraform, which is supposed to interfere with further evaporation. Obviously, the cheapest and best way of employing formaldehyd as a gaseous disinfectant will be the distillation of formalin solutions. It is a matter of unnecessary expense to convert formalin into paraform and then from this regenerate formaldehyd vapors. The autoclave employed by Roux and Trillat in their experiments with formalin gave excellent results. Unfortunately, the size, weight, and expense of such an apparatus precludes its general use, and limits it to the health boards of large cities and to large hospitals.

The fear of polymerization of formalin on boiling is not well grounded. Certain it is that formalin can be distilled from its aqueous solution without polymerization, and that the results obtained are in every way equal to those obtained from paraform, and decid-

edly superior to the so-called formalin lamps. We have made no tests with formalin lamps, being convinced that they were but ephemeral playthings which would not fulfil the requirements of practical disinfection.

The results given in Table III. were obtained by the distillation of the ordinary forty-per-cent. solution of formalin. One hundred and fifty cubic centimeters of formalin solution (5¼ fl. oz.), containing therefore 60 grams (2 oz.) of formaldehyd, were placed in a one-and-one-half-liter flask, and ten per cent. of sodium chlorid was added to prevent polymerization. Subsequent experiments showed that the addition of the sodium chlorid was unnecessary. The flask was provided with a rubber stopper and a bent glass tube, which was inserted into the room through the key-hole. The contents of the flask were then heated to boiling by means of a Bunsen-burner. In about fifty minutes the liquid was completely evaporated, and at no time was there a sign of polymerization. At the end of twenty hours, when the room was opened, the formalin vapors were intolerable.

TABLE III.—FORMALIN DISINFECTION.

Amount used.		60 grams rapid distillation.			120 grams slow distillation.		
Condition.		Dry.	Wet.	Control.	Dry.	Wet.	Control.
Anthrax.	S.	+	+	O	O	+	+	+	O	O	+
	M.	+	+	O	O	+	+	+	O	O	+
	G.	+	+	O	O	+	+	+	+	+	+
Symptomatic anthrax.	S.	+	+	O	O	+	+	+	+	+	+
	M.	+	+	O	O	+	+	+	O	O	+
	G.	+	+	+	+	+	+	+	+	+	+
Malignant edema.	S.	+	+	O	O	+	+	+	+	+	+
	M.	+	+	O	O	+	+	+	O	O	+
	G.	+	+	+	O	+	+	+	+	+	+
Tetanus.	S.	+	+	O	O	+	+	+	O	O	+
	M.	+	+	O	O	+	+	+	O	O	+
	G.	+	+	O	O	+	+	+	+	O	+
Hay bacillus.	S.	+	+	O	O	+	+	+	O	+	+
	M.	+	+	O	O	+	+	+	O	O	+
	G.	+	O	O	O	+	+	+	O	O	+
Potato bacillus.	S.	+	+	O	O	+	+	+	+	+	+
	M.	+	+	O	O	+	+	+	O	O	+
	G.	+	+	O	O	+	+	+	+	+	+
Cholera.	S.	O	O	O	O	+	O	O	O	O	+
	M.	O	O	O	O	+	O	O	O	O	+
	G.	O	O	O	O	O	O	O	O	O	O
Diphtheria.	S.	+	+	O	O	+	+	O	O	O	+
	M.	+	+	O	O	+	O	O	O	O	+
	G.	+	+	O	O	+	+	+	O	O	+
Glanders.	S.	+	O	O	O	+	+	+	O	O	+
	M.	+	O	O	O	+	+	+	O	O	+
	G.	O	O	O	O	O	O	O	O	O	O
Typhoid fever.	S.	+	+	O	O	+	+	+	+	O	+
	M.	+	+	O	O	+	+	+	O	O	+
	G.	O	O	O	O	+	+	+	+	+	+
Colon bacillus.	S.	+	+	O	O	+	+	+	+	O	+
	M.	+	+	O	O	+	+	+	O	O	+
	G.	+	+	+	+	+	+	O	+	O	+
Sanarelli.	S.	+	+	O	O	+	+	+	+	+	+
	M.	+	+	O	O	+	+	+	O	O	+
	G.	+	+	O	+	+	+	+	+	+	+
Havelburg.	S.	+	+	O	O	+	+	+	+	O	+
	M.	+	+	O	O	+	+	+	+	O	+
	G.	+	+	O	+	+	+	+	+	+	+
Psittacosis.	S.	+	+	O	O	+	+	+	+	+	+
	M.	+	+	O	O	+	+	+	O	O	+
	G.	+	+	O	+	+	+	O	+	O	+
Black plague.	S.	O	O	O	O	+	O	O	O	O	+
	M.	+	O	O	O	+	+	O	O	O	+
	G.	O	O	O	O	O	O	O	O	O	+
Staphylococcus pyo. aur.	S.	+	+	O	O	+	+	+	+	O	+
	M.	+	+	O	O	+	+	+	O	O	+
	G.	+	+	+	+	+	+	+	+	+	+
Pneumonia (Fraenkel).	S.	+	+	O	O	+	+	+	O	O	+
	M.	+	+	O	O	+	+	O	O	O	+
	G.	+	+	O	O	+	+	+	O	O	+
Green pus.	S.	+	+	O	O	+	+	+	+	O	+
	M.	+	+	O	O	+	+	+	O	O	+
	G.	+	+	+	O	+	+	+	+	+	+
Streptococcus pyogenes.	S.	+	+	O	O	+	+	+	+	O	+
	M.	+	+	O	O	+	+	+	O	O	+
	G.	+	+	+	+	+	+	+	+	O	+
Tuberculosis.											
Total positive growths.[1]		96		13	54	95		40		55	
Deducting hay bacillus.		91		13	51	89		39		52	

[1] See footnote to Table I.

Table III. combines the results obtained in four separate experiments. The first ten organisms were tried first in order to test the efficiency of the method. Subsequently suspensions of the other organisms were prepared and tested in a similar manner. These suspensions, as stated in the beginning, were very rich in bacteria. It should be understood that they were different from those employed in the Tables I. and II.

In the first set, 150 c.c. of formalin solution, representing 60 grams of pure formaldehyd, were distilled as rapidly as possible. In the second set double this amount was used, corresponding to 120 grams of pure formaldehyd. The distillation in this case was carried on at a slow rate, requiring about three hours to evaporate almost to dryness. It may be incidentally added that the formalin solutions employed were examined quantitatively and found to contain 39.7 per cent. of formaldehyd. The temperature in the room during the first set ranged from 17° to 24° C. (60.2° to 75° F.); whereas, in the second set, it ranged from 20° to 29° C. (67° to 80.4° F.).

As a result of the slow distillation many of the cover-glass preparations and silk threads dried out before enough formalin was present in the room, and hence acquired the resistance of dried specimens. This experiment is intended to show the importance of having the object to be disinfected in a wet condition and of rapid distillation of formalin. Although twice as much formalin was distilled as in the first set, yet the results were decidedly inferior, owing to the reason just given.

When the formalin is rapidly distilled the results are in no wise inferior to those obtained with paraform.

THIN SUSPENSIONS.

The first three tables contain the results obtained with thick suspensions prepared in the manner de-

TABLE IV.—THIN SUSPENSIONS.

Organisms tested.		Sulphur, A. 3 pounds. 20 hours.		Formalin, B. 60 grams. 20 hours.		Formalin (large room), C. 60 grams. per 1000 cubic feet. 20 hours.			Formalin, D. 60 grams. 10-hours exposure.	
		Dry.	Control.	Dry.	Control.	Dry.	Wet.	Control.	Dry.	Wet.
Anthrax.	S.	+ +	+	+ +	+	+ +	O O	+	O O	O O
	M.	+ +	+	+ +	+	O O	O O	+	O O	O O
	G.	O O	+	+ O	+	+ +	O O	+	+ O	O O
Symptomatic anthrax.	S.	+ +	+	+ +	+	+ +	O O	+	+ +	O O
	M.	+ +	+	+ +	+	+ O	O O	+	O O	O O
	G.	+ +	+	+ +	+	+ +	O O	+	+ +	O O
Malignant edema.	S.	+ +	+	+ +	+	+ +	O O	+	+ +	O O
	M.	+ +	+	+ +	+	O O	O O	+	O O	O O
	G.	+ +	+	+ +	+	+ +	O O	+	+ O	O O
Tetanus.	S.	+ +	+	+ +	+	+ +	O O	+	+ +	O O
	M.	+ +	+	+ +	+	O +	——	+	O O	O O
	G.	+ +	+	+ +	+	+ O	O O	+	+ O	O O
Potato bacillus.	S.	+ +	+	+ +	+	+ +	O O	+	+ +	O O
	M.	+ +	+	+ +	+	+ +	O O	+	+ +	O O
	G.	+ +	+	+ +	+	+ +	O O	+	+ +	O O
Cholera.	S.	O O	O	O O	O	O O	——	O	O O	O O
	M.	O O	O	O O	O	O O	——	O	O O	O O
	G.	O O	O	O O	O	O O	——	O	O O	O O
Diphtheria	S.	+ +	+	+ +	+	O O	O O	+	O O	O O
	M.	+ +	+	+ +	+	O O	O O	+	O O	O O
	G.	O O	+	+ O	+	O O	O O	+	O O	O O
Glanders.	S.	+ +	+	O O	+	+ O	——	+	O O	O O
	M.	+ O	+	O O	+	O O	——	+	O O	O O
	G.	O O	+	O O	O	O O	——	+	O O	O O
Typhoid fever.	S.	+ +	+	+ O	+	+ +	——	+	O O	O O
	M.	+ +	+	+ +	+	O O	——	+	O O	O O
	G.	O O	+	O O	+	O O	——	+	O O	+ +
Colon bacillus.	S.	+ +	+	+ +	+	+ +	——	+	+ +	O O
	M.	+ +	+	+ +	+	+ +	——	+	+ +	O O
	G.	O O	+	+ +	+	+ +	——	+	O O	O O
Sanarelli.	S.	+ +	+	+ +	+	+ +	——	+	+ +	O O
	M.	+ +	+	+ +	+	+ +	——	+	+ O	O O
	G.	O O	+	+ +	+	+ +	——	+	O O	O O
Havelburg.	S.	+ +	+	+ +	+	+ +	——	+	+ +	O O
	M.	+ +	+	+ +	+	+ +	——	+	+ +	O O
	G.	+ O	+	+ +	+	O O	——	+	+ +	O O
Psittacosis.	S.	+ +	+	+ +	+	+ +	——	+	+ +	O O
	M.	+ +	+	+ +	+	+ +	——	+	+ +	O O
	G.	O O	+	+ O	+	+ +	——	+	+ O	O O
Black plague.	S.	O O	+	O O	+	O O	——	+	O O	O O
	M.	O O	+	+ O	+	O O	——	+	O O	O O
	G.	O O	O	O O	+	O O	——	+	O O	O O
Staphylococcus pyogenes aureus.	S.	+ +	+	+ +	+	+ +	O O	+	+ +	O O
	M.	+ +	+	+ +	+	+ +	O O	+	+ +	O O
	G.	+ O	+	+ +	+	+ +	O O	+	+ +	O O
Pneumonia (Fraenkel).	S.	+ +	+	+ +	+	+ +	——	+	O O	O O
	M.	+ +	+	+ +	+	+ O	——	+	O O	O O
	G.	O O	+	O O	+	O O	——	+	O O	O O
Green pus.	S.	+ +	+	+ +	+	+ +	——	+	+ O	O O
	M.	+ +	+	+ +	+	+ +	——	+	+ +	O O
	G.	O O	+	O O	+	O O	——	+	O O	O O
Streptococcus pyogenes.	S.	+ +	+	+ +	+	+ +	O O	+	+ +	+ O
	M.	+ +	+	+ +	+	+ +	O O	+	+ +	O O
	G.	+ +	+	+ +	+	+ +	O O	+	+ +	+ O
Positive growths out of 108 specimens and 54 controls.		75	50	81	50	67		51	50	4

scribed. The silk threads, muslin squares, or coverglasses were coated with a mass of organisms, such as will hardly be met with in practice or in an ordinarily well-kept room. Such experiments, therefore, may be considered as very severe tests of the efficacy of the several methods studied. Ordinarily infectious material that may be scattered about in a room is in a fine state of division as dry dust. Even when infectious material as saliva or sputum in diphtheria, tuberculosis, etc., is spread over the surface of an article it dries down in a very thin layer, and it is safe to say contains but relatively few organisms in a given area, as compared with the test specimens from the thick suspensions mentioned above.

In order to obviate this objection a series of experiments were carried out, as given in Table IV., using very thin, *homogeneous* suspensions. For this purpose most of the test-organisms were grown for several generations of twelve hours each at 39° C. (102.2° F.). In this way very thin and perfectly homogeneous bouillon cultures were obtained. In one or two instances, where there was a tendency to the formation of scum, this was removed by filtration through a sterile absorbent cotton and glass-wool filter. The anthrax and potato-spore material were obtained from agar cultures. Only a portion of the surface growth was rubbed up with bouillon, and diluted to about 8 c.c, with sterile bouillon, and then filtered as above. Bouillon cultures of the anaerobic germs were employed, diluted with an equal volume of bouillon, and filtered to remove gross particles.

For each trial fresh specimens were prepared from these thin suspensions in exactly the same manner as in the preceding experiments. The same suspensions were used for all four experiments given in Table IV. In order to prevent alterations in the suspensions in the two and one-half days necessary for the four experiments, the suspensions were kept in a jar in melting ice. No change was observable in the material thus kept.

In experiments A, B, and C the exposure was continued twenty hours, as in all previous experiments. Experiment D was of only ten-hours' duration. In experiments B, C, and D the vapors of formaldehyd were distilled into the room through the key-hole by boiling formalin solution in the apparatus to be presently described. The same room has been used for all the experiments described in this paper except in Experiment C, Table IV.

Experiment A.—A comparison of the results obtained with thin suspensions will show little or no difference from the results given in Table I. Only dry specimens were exposed, as previous trials had clearly shown that three pounds of sulphur would destroy all vegetating forms in the wet condition. Omitting the hay bacillus results in Table I., inasmuch as this organism is not represented in Table IV., it will be seen that out of a total of 108 dry specimens 74 survived exposure in Table I. and 75 in Experiment A, Table IV. The temperature of the room varied from 20 to 24° C. (60.7°–70.5° F.). The odor at the end of 20 hours was tolerable.

Experiment B.—In this experiment 150 c. c. of formalin solution was distilled into the room within about thirty minutes. The temperature of the room varied from 20 to 22° C. (60.7°–70.1° F.). The odor at the end of twenty hours was tolerable. For the reason mentioned under Experiment A only dry specimens were exposed. The results were fairly satisfactory, as 81 out of 108 dried specimens survived the exposure. These results however are by no means as good as those in Experiments C and D, wherein the same method was followed. This is probably due to slower and possibly less complete distillation.

Material from a tuberculous lung cavity, very rich in tubercle bacilli, was divided into three portions and placed in wide Esmarch dishes. One of these was exposed to a temperature of 39° C. (100.2° F.) for about three hours or until dry. A second was exposed in the wet condition and the third reserved for direct use as a control. After exposure bouillon was added to each of the dishes, the material was thoroughly rubbed up and injected intraperitoneally into guinea-pigs. The control guinea-pig died within twenty-four hours as a result of diplococcus infection. The guinea-pig that received the dried material likewise died of diplococcus infection within less than three days; whereas, the guinea-pig that received the material which was exposed in a wet condition survived without the slightest illness, but when killed three weeks later it showed small tuberculous nodules in which tubercle bacilli were demonstrated. These results show that in a *dried layer* of sputum the micrococci of sputum septicemia (Fränkel's diplococcus) will survive exposure to formaldehyd and undoubtedly this is likewise true of the tubercle bacillus since it possesses in general a greater resistance than these organisms. In moist material the diplococci are killed more readily than tubercle bacilli. The latter undoubtedly escaped destruction owing to the large amount of material used (3 c. c.) and the presence of more or less solid particles.

Experiment C.—This experiment is given as a crucial test of the value of the formalin-distillation method. The large laboratory-room was employed for this purpose. The dimensions of this room are 36⅓x36⅙x12½ feet. It contains therefore 17,334 cubic feet (490.84 c.m.). The room has seven large windows and two doors; also, six or eight ventilating-shafts which unite into a main shaft in the attic. Large cracks extended around the entire edge of the ceiling. The ventilating- and cold-air shafts were plugged with bundles of old cloth. The cracks in the ceiling, about the edge of the floor, windows, and doors were caulked with strips of cloth.

On the basis of 60 grams of pure formaldehyd per 1000 cubic feet, 2600 c.c. of the 40-per-cent. formalin solution was necessary for the disinfection of this room. This amount could not be added all at once to the apparatus which was employed and will presently be described. One liter of the solution was placed in the apparatus and in about three-fourths of an hour a second liter was added, and

after a like interval the remaining quantity was introduced. A little over three hours was necessary to distil this amount of formalin. Attention may be called to the great advantage of this apparatus over the so-called formalin lamps, or even the paraform apparatus. The same apparatus will do for large or small rooms. If all the formalin necessary for disinfection cannot be at once added, it can be introduced in portions during the process itself.

The specimens were placed at the further end of the room. A complete set of dry specimens and in addition wet specimens of spore material were exposed. At the end of twenty hours when the room was entered the formalin vapors were intolerable, and at no time were they noticeable in the adjoining rooms.

As shown in Table IV., C, all the wet-spore specimens were disinfected. Of the 108 dry specimens 67 survived exposure. The fine dust taken from the floor at the farther end of the room was sterile. The dust on the top of the cases in the room had apparently lain there for a year or more. A considerable amount of this could easily be gathered by means of a sterile spatula. Portions of dust, the size of a small pea, placed in bouillon showed no sign of growth for the first couple of days, eventually however a "potato bacillus" developed. Practically therefore all surface dust in the room, and a large portion of the specimens exposed were disinfected.

Experiment D.—One hundred and fifty cubic centimeters of formalin solution was distilled as rapidly as possible (within ten minutes) into the disinfecting room of 1000 cubic feet capacity. The formalin vapors were allowed to act during ten hours. The room was then opened. The vapors were present in such amount as to be insupportable. The temperature ranged from 20 to 22° C. (60.7°–70.1° F.). Both dry and wet specimens were exposed. The control-tests given under *C* are also applicable to *D* since both tests were made at the same time and with the same material.

Of the wet specimens only four survived. Three of these were cover-glass preparations, and one a silk thread. They undoubtedly dried out before the gas had acted a sufficient length of time. Of the 108 dry specimens only fifty survived. This it will be seen is the best result obtained in this series of experiments.

By *rapid* formalin distillation it is, therefore, possible to disinfect all wet material within ten hours. Possibly one-half this time is sufficient for the accomplishment of the same result. Dried specimens of the germs of cholera, diphtheria, glanders, typhoid fever, black plague, and pneumonia, were all destroyed in the same time.

No experiments were made with less than 60 grams of formalin per 1000 cubic feet.

AVAILABILITY OF FORMALIN.

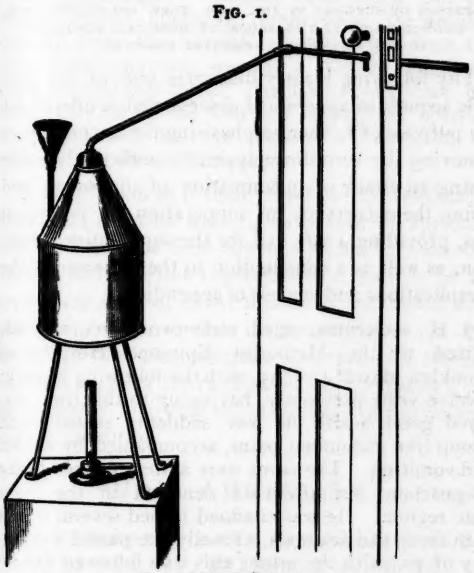
While sulphur fumigation under certain conditions (as shown in the preceding experiments) is of value, it is nevertheless evident that it is more obnoxious to persons in adjoining rooms, more injurious to fabrics, and certainly less effective than formalin. There can be no question but that formalin will eventually wholly displace sulphur fumigation. Formalin, perhaps, as yet, may not be obtained in every drug-store, but it undoubtedly will soon be as easy to obtain as sulphur.

As indicated heretofore formaldehyd vapors may be obtained in three ways: (1) By incomplete combustion of methyl alcohol. This is the basis of the so-called formaldehyd lamps in which the slow combustion and uncertain action make them of very little or no practical value. (2) By the polymerization of formalin, thus converting it into the solid form. On heating this material by means of an alcohol lamp the formaldehyd is regenerated. While this method gives excellent results and is much more certain than a formaldehyd lamp, it nevertheless possesses certain drawbacks. In the first place an additional and unnecessary expense is created in making paraform out of formalin and in regenerating the gas from this compound. Again, the apparatus for heating the paraform is placed within the room to be disinfected, and remains there until the room is opened. It is not possible to disinfect a number of rooms in the course of a day, unless a corresponding number of "disinfectors" are at hand. For the disinfection of a very large room a number of such machines must be employed. Moreover, the apparatus cannot be almost constantly watched either to prevent fire or to control the method itself. The third method of using formaldehyd consists in heating the commercial formalin or formol which is a forty-per-cent. solution of formaldehyd. Formaldehyd vapors are thus generated, and can be injected through a key-hole into a room. The statement is freely made that formaldehyd solutions cannot be heated without polymerizing and thus interfering with further evaporation. Formalin if heated slowly in an open dish may possibly polymerize, especially when concentrated to about 25 c.c., but we have never found this to take place when the formalin solution was rapidly heated in a glass flask or copper container. This fact can be utilized as the basis of a practical method for room disinfection.

Roux and Trillat devised an autoclave in which the formalin could be superheated and the resultant vapors then injected into the room. Various modi-

fications of their apparatus have appeared from time to time. So far as our knowledge goes none of these can be said to possess the merits of cheapness, simplicity, and general usefulness. The results obtained by distillation of formalin from a glass flask (given in Table III.) were such as to justify further experimentation. The outcome was the construction of a very simple apparatus shown in the accompanying sketch. A similar apparatus, designed by Professor A. B. Stevens, has been in use in the Chemical Laboratory to produce steam for distillation purposes. The experiments with formalin described in Table IV. were made with this apparatus, and are a sufficient testimonial of its usefulness.

FIG. 1.



Formaldehyd Generator.

The container is six inches in diameter. The height of the cylindrical part is five inches; the total height to the top of the neck is ten inches. The capacity of the cylindrical part of the container is 2300 c.c. (approximately, 5 pints). An inclined tube twelve inches long and one-fourth inch in diameter screws into the neck. This is connected by means of a short piece of rubber tubing to a narrower tube, which is twelve inches long and three-sixteenths of an inch in diameter. A rubber connection between the tube is better than a rigid one. The end tube readily passes through an ordinary key-hole. The first tube is inclined to permit reflow of condensed water.

The funnel-tube is prolonged into the interior of the container, and extends to within one-sixteenth of an inch of the bottom. The height to the top of the funnel is eleven inches, and the diameter of the funnel-tube is five-sixteenths of an inch. The funnel-tube serves a double purpose in that it permits the introduction of the formalin solution, and serves as an indicator of the completion of the distillation. As soon as the liquid in the container has evaporated down to the level of the bottom of the funnel-tube, the formalin vapors and steam will issue from the tube. Therefore, when this tube extends down to within one-sixteenth of an inch of the bottom, practically the entire quantity of the liquid can be distilled into the room to be disinfected, not more than 10 grams of residue being left in the apparatus at the close of distillation.

The vessel is made of copper and the tubing of brass. The apparatus is placed on a tripod and heated with a Bunsen-burner. It may be placed on a gas or gasoline stove, or over a kerosene lamp. A portable heater similar to a plumber's lamp will undoubtedly be most useful.[1]

The formalin should be as rapidly boiled as possible. A good Bunsen-burner will distill 150 c.c. (5 oz.) of formalin, the amount necessary for 1000 cubic feet of space, within ten or fifteen minutes. When the room is very large, as in Experiment C., Table IV., the necessary amount of formalin may be added in several successive portions. It is perhaps desirable not to add the formalin too rapidly, inasmuch as the rapid cooling of the contents might result in the production of paraform. An increase of heat immediately after such addition will serve to promptly dissolve any paraform which might be formed. It is well to repeat, by way of emphasis, that there will be no trouble with polymerization when formalin is heated in a flask or in this disinfecting-apparatus. Should there be a tendency for the formalin to polymerize it can be prevented by the addition of 5 or 10 grams of borax. Solid paraform may be added to boiling formalin in a flask, and it will dissolve, forming an opaque white liquid. If a little borax is present the paraform will dissolve perfectly. It may be interesting to note that if 5 grams of borax and 60 grams of paraform are added to 100 c.c. of forty-per-cent. formalin and heated, perfect solution will result.

Commercial formalin, then, dissolves a considerable amount of paraform on heating, and the amount may be increased by the addition of borax. This fact may be utilized in shortening the time of distillation. Thus, to disinfect a room of 2000 cubic feet capacity, 150 c.c. of formalin, 60 grams of para-

[1] A small ordinary kerosene burner can be used to heat the formalin in the apparatus. Two hundred and fifty cubic centimeters of formalin can be raised to the boiling-point in about ten minutes, and the distillation will be complete in about one hour. A parallel test, made with a modified plumber's gasoline lamp, especially made for us by Wm. A. Nicholas & Co., 940 North Clark street, Chicago, caused a like quantity of formalin to boil in four minutes, the distillation being complete in less than thirty minutes.

form, and a little borax can be introduced into the apparatus. This mixture could be distilled in one-half the time necessary for 300 c.c. of formalin.

Paraform when suspended in water and boiled will cause much foaming, and it cannot therefore be distilled with water in this operation. If, however, it is added to formalin, with or without borax, it can be distilled very rapidly without the slightest foaming.

At the close of a distillation it not infrequently happens that the formalin vapor present in the container condenses and polymerizes. A solid plug of paraform is thus formed. Consequently, before using the apparatus care should be taken to see that the tube is open. If this is not the case, on gentle heating the paraform will be readily volatilized, or a wire probe can be passed through the tube.

As seen from the illustration and description the apparatus is simplicity itself, and can be made by any tinsmith. It can be obtained from the Eberbach Hardware Company of Ann Arbor, or from Parke, Davis & Co. of Detroit.

The advantages possessed by this apparatus may be briefly summarized. One apparatus is sufficient regardless of the size of the room or rooms to be disinfected. The same apparatus can be used for almost any number of disinfections in the course of the day. The distillation of formalin into an ordinary room need not take more than twenty or thirty minutes. It is easily portable since it is very light, and is not voluminous. Inasmuch as it remains on the outside of the room before the eyes of the operator, there is absolutely no danger of fire or explosion. The apparatus, formalin, and fuel are inexpensive.

In conclusion, the following general directions for the disinfection of rooms may be of value:

1. All cracks or openings in the plaster or in the floor or about the door and windows should be caulked tight with cotton or with strips of cloth.

2. The linen, quilts, blankets, carpets, etc., should be stretched out on a line in order to expose as much surface to the disinfectant as possible. They should not be thrown into a heap. Books should be suspended by their covers so that the pages are all open and freely exposed.

3. The walls and floor of the room and the articles contained in it should be thoroughly sprayed with water. If masses of matter or sputum are dried down on the floor they should be soaked with water and loosened. No vessel of water, should, however, be allowed to remain in the room.

4. One hundred and fifty centimeters (5 ounces) of the commercial forty-per cent. solution of formalin for each 1000 cubic feet of space should be placed in the distilling-apparatus and as rapidly distilled as possible. The key-hole and spaces about the door should then be packed with cotton or cloth.

5. The room thus treated should remain closed at least ten hours. If there is much leakage of gas into the surrounding rooms a second or third injection of formaldehyd at intervals of two or three hours should be made.

A CASE OF FECAL COMMUNICATION WITH THE BLADDER, WITH RESULTING CALCULUS FOLLOWING APPENDICITIS.[1]

BY GEORGE RYERSON FOWLER, M.D.,
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PROFESSOR OF SURGERY IN THE NEW YORK POLYCLINIC; SURGEON-IN-CHIEF TO THE BROOKLYN HOSPITAL; SURGEON TO THE METHODIST EPISCOPAL HOSPITAL.

THE following history illustrates one of the possible sequels to appendical abscess, and is offered for the purpose of further emphasizing the importance of removing the vermiform appendix sufficiently early during an attack of inflammation of the organ and before the occurrence of suppuration, or failing in this, providing a safe exit for the suppurative collection, as well as a contribution to the literature of the complications and sequels of appendicitis:

J. B., a German, aged sixty-two years, was admitted to the Methodist Episcopal Hospital of Brooklyn March 4, 1895, with the following history: Twelve years previously, having up to this time enjoyed good health, he was suddenly seized with cramp-like abdominal pains, accompanied by nausea and vomiting. The pains were at first referred to the epigastrium, but afterward centered in the right iliac region. He was confined to bed several weeks with fever and anorexia. Finally, he passed a quantity of pus with the urine; this was followed by relief of the symptoms. Shortly afterward he began to pass fecal matter with the urine. This has continued to a greater or lesser extent ever since.

Since the first appearance of fecal matter in the urine he has suffered from chronic cystitis, with occasional acute exacerbations. One year prior to admission to the hospital these symptoms became greatly aggravated, with severe pain in the perineum and penis, together with dysuria and vesical irritability. The pain has kept him confined to his home, and most of the time to his bed, during the past few months. He has frequently suffered from obstruction to urination, due to the engagement of fecal masses in the vesico-urethral orifice, but of late, in addition to this, there has been the sudden cutting off of the outflow during the act of micturition characteristic of vesical calculus.

Upon admission the patient presented the appearance of a feeble and broken-down old man, and hav-

[1] Read at the Nineteenth Annual Meeting of the American Surgical Association, Held at New Orleans, April 19, 20, and 21, 1898.

ing been placed under the influence of an anesthetic, the sound detected the presence of a medium-sized calculus in the bladder. The bladder was at once opened with the double purpose of removing the calculus, and at the same time affording ready exit of the fecal matter which passed into it from the bowel. A phosphatic calculus the size of a horse-chestnut was removed.

The right lateral portion of the fundus of the bladder was found adherent to the structures in the neighborhood of the cecum, forming a deep pouch, from the bottom of which fecal matter in small quantities was forced during the manipulation incident to the examination. No neoplasm was present. Owing to the feeble condition of the patient the abdomen was not opened.

The patient gained rapidly in strength, but declined further operative interference. He was discharged from the hospital several weeks from the time of the operation, wearing a Bolton Bangs' suprapubic drainage-tube. His family physician has since reported to me that the suprapubic opening has healed, and that the patient is free from all traces of his former difficulty.

It would seem as if there could be no reasonable doubt that this case was originally one of appendicitis, and that the fecal communication between the bladder and intestine resulted from a rupture of an appendical abscess, either into both the bowel and the urinary viscus, or into the latter alone. In the latter case the communication occurred with the cecum as a result of the restoration of the patency of the appendix following the subsidence of the inflammatory condition.

WAR ARTICLES.

SANITARY NOTES UPON THE PROVINCES OF PINAR DEL RIO, HAVANA, MATANZAS, AND SANTA CLARA.[1]

By HENRY I. RAYMOND, M.D.,
CAPTAIN AND ASSISTANT SURGEON, UNITED STATES ARMY, STATIONED AT CAMP TAMPA HEIGHTS, FLORIDA.

THROUGH the courtesy of the Chief Surgeon of the Second Independent Division of United States troops in the field I am enabled to present to the readers of the MEDICAL NEWS a full and reliable report, submitted by S. Cueroo, M.D., a Cuban physician of many years' professional experience in that country, upon the water-supplies and the healthful or infected conditions of all important towns or localities throughout the four most westerly provinces of the Island of Cuba.

The report by Dr. Cueroo is so succinct and important for our practical guidance in the event of the occupation of Cuba by United States troops, that I present it without abridgment.

[1] The facts herein contained are based upon the personal knowledge and experience of Cuban physicians.

HAVANA PROVINCE.

Havana.—All kinds of infectious diseases. Water-supply contaminated.

Marianao.—Yellow fever, when imported; good supply of water.

Guanabacoa.—Same conditions; good water.

Guines.—Yellow fever, when imported; malaria; bad water.

Jaruco.—No yellow fever; good water.

Alquizar.—No yellow fever; malaria; good water from wells.

San Antonio de los Baños.—Yellow fever, when imported; springs and river water good.

Guanajay.—Yellow fever, when imported; malaria; good well water.

Bepical.—No yellow fever; good well-water.

Guincan.—No yellow fever; good well-water.

Santa Maria Bosano.—Very healthful city; no yellow fever; springs and good well-water.

Santiago de las Vegas.—Healthful city; deep wells; good.

Guira de Melena.—No yellow fever; malaria; well-water.

Batabano (south shore).—Very unhealthful; yellow fever, malaria, and typhoid fever; very bad water.

Aguacati.—Healthful place; well-water.

Madruga.—Very healthful locality; very good water; sulphur springs.

Nueva Par and *San Felipe.*—No yellow fever; well-water.

Guava, Castatina, Melena del Sur, Hoyo Colorado, Cannito, Guayabal, Guatao, Wajay.—No yellow fever; malaria; well-water.

Bauioa.—No yellow fever; healthful place; well-water.

MATANZAS PROVINCE.

Matanzas City.—Yellow fever and all kind of infectious diseases. Contaminated water.

Union de Reyes.—No yellow fever; well-water.

Suba Mocha.—Healthful locality; deep wells; good water.

Sabonitta.—No yellow fever; malaria; well-water.

Cardenas (Dr. Menvial).—Twenty-five thousand inhabitants; has two classes of water-supply: from wells which are almost all contaminated, and from the town's reservoir, supplied by a spring, but this spring-water is heavy and very sedimentous or incrustant, and is but slightly palatable. Many people there drink rain-water.

Malarial locality in autumn; dysenteric in summer. Yellow fever prevails there every year from June to October. Many cases of diphtheria and sore throat in dry season on account of the dust.

The soil is very permeable and the material of the macadam is very fragile. In time of grippe, this disease spreads very rapidly, because the dust forms clouds throughout the whole town.

Recreo.—Situated fifteen southeast of Cardenas; has four or five thousand inhabitants; low and red earth; paludic region; dysenteric in summer; no yellow fever except when imported; all the zone between the two places is very low, marshy, and swampy; somewhat malarial; travel almost impracticable by horses. San Anton River and what is called the "Canal of San Anton" (by which the inundation of "El Roque" empties its waters into the bay of Cardenas) are the water-channels of this district.

Hato Muevo.—Situated about fifteen miles east northeast of Recreo; has two thousand inhabitants. A range of uninterrupted mountains, fifteen miles long, divides this section of country into two zones; one in the southern part, higher, has many wells; some of them of good quality as to their water, and about ninety feet deep; without rivers in all the extension of this zone. The northern part, in which is situated Hato Muevo, is supplied from wells whose water is contaminated; these wells become filled up with water, usually in the summer season after heavy rainfalls. We have in this northern zone, malaria and dysentery, but never yellow fever. That part of the zone south of Cardenas is deprived of rivers and we have very few springs.

The Cuban physician furnishing this information on Matanzas Province has practised medicine for nine years in the zones above-mentioned and extending from Cardenas to Colon, and is therefore, well qualified to speak *ex cathedra*.

PINAR DEL RIO PROVINCE.

City of Pinar del Rio, Consolacion del Sur, Paso Real de San Diego, Palacios, San Cristobal, Candelaria.—Yellow fever only when imported; water good. All these cities are located in the southern plains of the province; more or less malarial localities.

Cabanas, Bahia Honda, and *Mariel.*—On the south shore; are very malarial; no yellow fever. All small localities in the hills are quite healthful and well supplied with good water.

SANTA CLARA PROVINCE.

The territory of "Sancti Spiritus," located in the central and southern part of Cuba, is very abundant in spring water, of excellent quality for drinking-purposes. One can rest assured that within a circumference of four miles in the greater part of this territory, a stream of water can be found. The territory forms an inclined plane that gradually rises from the southern coast with an occasional abruptness. It extends from southeast to northwest, forty-eight miles; from northeast to southwest, seventy-eight miles; from north to south, sixty miles.

The principal city, Sancti Spiritus, with fourteen thousand inhabitants, is thirty-six miles from Tunas de Laza, the port of entry, and is 570 feet above the level of the sea. A railroad runs between these two places, making four different stops on the road at as many villages.

Tunas de Laza, the port of entry, has only rain-water, but the railroad crosses one river and five streams of very good drinking-water.

The city (Sancti Spiritus) is divided by the Yayabo River, and its water is supplied to the inhabitants through iron pipes; there is also a small stream to the east of the city; one mile east and west of the same city there are found two other streams; all of these streams have very good water.

Leaving the city of Sancti Spiritus at any point of the compass, about every four miles good and abundant water can be found in all this territory.

This section of country continues rising toward the north and more so toward the west, terminating in mountains, some of which rise about 9000 feet, giving rise to many streams.

The principal rivers are: The *Laza,* navigable twenty-one miles; traverses the whole territory from north to south; its waters are good up to six miles south of the city of Sancti Spiritus.

The *Jatibonico del Norte* and *Jatibonico del Sur* have very good water; these two rivers form the eastern boundary of the territory, both rise from the same spring, one following north and the other south.

The *Tuinucu,* quite deep, rises in the mountains in the west from the same source as the Yayabo. The *Banos* rises also in the mountains and flows south into the sea, twelve miles to the west of Tunas de Laza; near the coast this river is known as the Tayabacoa. The *Higuanojo* rises also in the mountains and flows south into the sea, eighteen miles west of Tunas de Laza. This river forms the territorial boundary to Trinidad.

In the country lying between these rivers are innumerable springs, all of excellent water.

The climate is not excessively damp on account of the excellent drainage due to the gradual slope of the land. All the rivers have many good fords, except the Laza and Tuinucu, which in the rainy season are impassable for some days. To the east of this territory water is less abundant.

This territory suffers from yellow fever only when that disease is imported by Spanish troops, and at various times eight years in succession have elapsed

without a case. The vegetation is luxuriant and woods are plentiful. The maximum temperature is about 95° F., and the minimum 45° F. No typhoid fever or diphtheria.

This short account of the Sancti Spiritus' waters and its excellent territorial conditions as to climate and healthfulness is very refreshing to one's mind after contemplating the plague-stricken cities along the shores of the more westerly provinces.

SANITARY SERVICE IN BATTLE.[1]

By H. F. NICOLAI, M.D.,
MILAN, ITALY.

LOCATION OF THE FIRST DRESSING-STATION.

ON approaching the enemy, the regimental surgeons should make careful note of the ground gone over, in order to be prepared to select the best locations for the establishment of dressing-stations in case it comes to battle. Until the conflict actually begins, and it is clear in what direction it is going to develop, no dressing-stations are, however, actually instituted. The bearers assemble at the hospital wagons, and, superintended by an assistant surgeon, place their own equipment on the wagons and take their dressing-cases therefrom. Upon consultation of the senior medical officers of the battalion, regiment, and brigade, and of the regimental commander, the exact location of the dressing-stations is decided, but nothing is unpacked until the battle assumes a distinct form, the line of advance and of possible retreat become apparent, and the direction of fire and of available cover are considered. The dressing-station, once established, does not require to be removed unless the distance from it to the line of battle becomes too great for the bearers to traverse, or the station comes under fire; or, finally, the troops retreat. Under the first two conditions there is usually an abundance of time for the chief sanitary officer to select a new site for the station. But a retreat, if it occur, takes place suddenly, and in locating and conducting a dressing-station surgeons should always have this eventuality in mind. To facilitate rapid evacuation, as well as not to encumber the sanitary officers during battle, the slightly wounded should be immediately sent to the rear, and those who are not able to walk must be put in condition as soon as possible to stand transportation to the principal dressing-station, field-hospital, or some fixed point where they may receive proper care. For this purpose a number of vehicles should be kept close at hand. Surgeons in charge of advanced dressing-stations should keep in mind that only those must be treated who require immediate attention; for the medical officers at these points must be free to meet and grapple with unexpected emergencies. The choice of the site for the principal dressing-station is made in the same way. The Division Surgeon informs himself of the probable line of action and of the topography of the country; while, acting under his direction, the commander of the sanitary detachment and his subordinates select the exact site of the station, and make arrangements for the sanitary wagons and ambulances, for the erection of tents, and for cooking. Nothing is actually unpacked, however, until the conflict begins, as there will be plenty of time thereafter to prepare for even the most complicated operation. The possibility of a forward or backward movement should again be remembered, and every one should know his duties and be able to perform them rapidly and systematically in case a sudden movement is necessary. In choosing a position for a dressing-station, it is advisable to recall the three zones of battle described by Bircher: (1) The marching zone—to within about 1500 meters of the enemy; (2) from that point to the main firing position, or to within 500–600 meters of the opposing force; and (3) the zone of decisive conflict (Entscheidungszone). While gunshot injuries may occur in all three zones, at first the greatest losses will take place while the troops are deploying or in the zone of development; and both they who wish to approach in safety as near as possible to the enemy, and the sanitary officers who desire shelter for the wounded, will utilize all available cover. The flat trajectory of the modern missile has the advantage that, at short range, a relatively slight elevation will afford protection. A bullet shot from a distance of 2200 yards, if it pass over an elevation of 270 feet, will not reach its mark until it has traversed 1300 yards behind it; and a greater elevation than this cannot be shot over if aim is taken along the line of vision. An obstacle 250 feet high affords protection to a space about 2000 yards behind it; one 100 feet in height, at a distance of about 1000 yards from the enemy, shelters 1500 yards, and an elevation of 40 feet, if the enemy be distant less than 1000 yards, protects a distance of from 600 to 1000 yards in its rear. These facts are of the greatest moment in the choice of a location for a dressing-station, which must be near enough to the firing-line to afford aid to the wounded, and yet occupy a position where those already injured may be sheltered. From what has been said, the importance of adequate cover will be readily seen, and it will also be clear that withdrawal in a straight direction from the firing-line is not the way to secure necessary protection. In fact, the site chosen should be behind cover within the area of danger; which position may, however, become untenable in the event of the retreat of the enemy and necessitate an advance of the dressing-station, as was exemplified in the case of Sanitary Detachment No. 2, Eighth Army Corps, at Spicheren. Finally, the question arises, How can those who fall wounded in the fighting-line be most efficiently succored. The War Sanitary Regulations provide that one-half of the regimental surgeons and hospital assistants must remain at the dressing-station, while the other half accompanies the troops into action. It is maintained by some that a surgeon, if in line of battle, can save many lives by promptness, and that the moral effect of his presence is of great service to soldiers in danger. The author is of opinion, however, that the four bearers of a company, if properly trained, can render, on the few occasions when immediate aid is needed, far more assistance than one surgeon, however skilful and cool he may be, and that

[1] *Deutsche Mil.-Arztl. Zeitschr.*, Berl., 1897; as translated, and appearing in the *National Medical Review*, May, 1898.

the latter can do much more good at the dressing-station than with the troops. One point upon which the author lays particular stress is that it is never wise to select buildings of any kind for dressing-stations, on account of their liability to catch fire. Many instances of this lamentable accident, where it was impossible to remove the wounded, have been recorded, one in the war of 1870–71. It is far better to select positions, not *in* buildings, but *behind* them, since these can be the more readily evacuated.

MEDICAL PROGRESS.

A Sanitary Barber-shop.—According to BERGER (*Centralbl. für Bakteriol.*, March 10, 1898) the conditions existing in barber-shops are responsible for the spread of many diseases, not merely of the skin, hair, and beard, but infectious maladies as well. He suggests the following rules for practical guidance of barbers and legislators, since he considers that a barber-shop is properly subject to public control. The barber himself should be free from epilepsy, spasms of any kind, drunkenness, and infectious diseases. Persons afflicted with contagious diseases of the skin, hair, beard, or genitals, should not be allowed in a public shop, but should be attended to at their homes, where they should have all their own instruments. In the shop all brushes and combs should be made of good material, so that they may withstand frequent disinfection. Puff-balls should be replaced by balls of absorbent cotton, which should be thrown away after they have been once used. Towels, etc., should be freshly laundered for each person, unless paper napkins are employed and used only once. Combs should be cleaned and disinfected with corrosive-sublimate solution after each use. Shears, razors, and clippers should be boiled or wiped thoroughly with alcohol after each use. A barber should never wipe the razor upon his hand. Brushes to dust away the cut hair from the neck should be forbidden. A barber should pay special attention to the cleanliness of his own hands and person, and should be instructed in the appearances of diseases of the skin, scalp, beard, and genitals.

A Digestive Fever in Children.—COMBY (*Med. Moderne*, February 16, 1898) says that a light or severe fever is often observed in children from three to ten years of age, who are given improper articles of food. It shows itself at night by restlessness, redness of the cheeks, or perspiration. In the morning there is no fever, but the little one is pale and languid. These attacks may come every day, or only occasionally. The fever is moderate, usually 38 to 38.5° C. (100.5° to 101.5° F.), and lasting one, two, or three days. Anorexia, great thirst, a coated tongue, chronic constipation, and fetid stools, are the common symptoms. The treatment should correct the diet, and facilitate digestion by the administration of pepsin, magnesia, rhubarb, nux vomica, calomel, etc. Quinin and alcoholic preparations will do more harm than good.

Two Cases of Purulent Pleurisy in the Child Cured by Puncture.—VARIOT (*Rev. de Therapeut.*, April 1, 1898) succeeded in curing a certain number of cases of purulent pleurisy in children by simple puncture. Clinical observation is the best guide in determining what patients should be subjected to puncture, and what ones should be subjected to the usual operation for empyema. If the amount of pus is small, and the respiratory function is not interfered with, if the digestion is good and there is little fever, the conditions are such that one may well hope for a complete cure from a simple puncture. If on the other hand, the heart beats strongly and respiration is hampered, while there is high fever, and the amount of fluid in the pleural cavity is large, resection of a rib is indicated. Also, if after a puncture, the symptoms grow worse with high fever and putrid discharge, no time should be lost, but the chest should be opened widely and thoroughly drained.

THERAPEUTIC NOTES.

Treatment of Cutaneous Anthrax by Injections of Iodin.—ASMOUSS (*Rev. Therapeut.*, April 15, 1898), practised injections into the periphery of cutaneous nodules of anthrax of tincture of iodin, diluted with one or two parts of distilled water. Two patients so treated received from four to eight injections each, and injections were also made in the vicinity of secondarily infected glands. Treatment in one case was continued for ten days, in the other for two weeks. Both patients recovered. No symptom of iodism was at any time manifested. The author says that this treatment is especially adapted to anthrax occurring under circumstances prohibiting surgical treatment.

Tincture of Strophanthus in Cardiac Affections.—JACOBÆUS (*Klin. Ther. Wochenschr*, March 13, 1898), warns against a too hasty conclusion that strophanthus and digitalis have benefited a patient suffering from heart disease, because improvement has followed the use of these drugs. Rest in bed alone will often cause a marked improvement in such patients, and it is better to defer the administration of these precious remedies until it is manifest just how much benefit is going to follow decubitus. Strophanthus has the great advantage over digitalis in not being cumulative in its action. In grave emergencies, however, some physicians prefer not to trust to it alone. It is then best to give it alternately with digitalis and in small doses, for in this manner an effect is produced which could not be obtained by the administration of either of the drugs separately, in the same amounts. In all cases in which there are associated disturbances of digestion, as well as in all cases in which the medication will have to be administered for a long time, strophanthus ought to play the chief part. In conclusion the writer states that there are certain cases of asystole, in which small doses of strophanthus are more efficacious than large doses of digitalis. At present he is not able to recognize such cases in advance, and it is therefore advisable in all cases to begin with strophanthus, a remedy which is always more manageable and sometimes more powerful than digitalis.

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SATURDAY, MAY 21, 1898.

FOOTGEAR FOR THE SOLDIER.

THE greatest English soldier and commander of modern times said that the most essential thing for a soldier is a good pair of boots, and the second most essential thing is a second pair of boots. Every one who has had any experience with marching troops will be likely to agree with this immortal. Now that 125,000 of our National Guardsmen, from all walks and stations of life, have been mustered into the regular service, it behooves the commissary department of the army and its various agencies to use supreme vigilance, precaution, and wisdom in providing suitable footwear for this vast number of practically raw recruits.

It probably does not overshoot the mark to say that eighty per cent. of the men who have enlisted are improperly shod on entering service. And if the commissary department is not in possession of properly accredited and well-advised purchasing agents, these soldiers are likely to be seriously handicapped and many of them made useless as implements of war when they come to be landed in Cuba or the Philippines, where they will be subjected to tests of unaccustomed climate and soil. The quartermasters of companies should therefore bear in mind in attending to the shoeing of their troops that they are not dealing with the normal foot in the vast majority of cases. This is the first obstacle to contend with. The second is the vanity of man concerning his feet, even though he be a soldier.

The absolute requisites in a shoe for marching are that it be comfortable and enduring; that is, that it be made on the right kind of a last from the proper material, and that it be properly and firmly put together. The essential elements of the first are that it have a straight inside line; that the sole lie flat or nearly flat upon the ground; that the arch be firmly and solidly supported; that the shoe fit snugly around the heel and the instep, and finally, in order that the pressure may be equally distributed, that there be sufficient room for the unhampered play of each pedal articulation when the weight of the body is successively thrown upon it. Unless the shoe fulfils these indications it should be discarded. The sole should project beyond the upper so as to give firm support to the foot when it is fully expanded under the combined influence of the weight of the body and the resultant muscular relaxation of fatigue; and it should be composed of solid double sole, not paper or leather packing sandwiched between two thin pieces of leather which unfortunately is often found. The uppers should be of stout, yet pliable, thoroughly seasoned hide, double stitched, and by proper dressing made impervious to moisture. If these details are insisted upon more will be done toward contributing to the capacity of the soldier than by the most elaborate system of acclimatization. It is more necessary to make Mulvaney immune to fatigue than it is to make him immune to fevers; by accomplishing the former you encompass the latter.

A properly clad, well-fed American soldier is well prepared to give battle to the Cuban germ and the Spanish parasite, but he expects his Government and its officers to provide him with the most approved implements of war and accoutrement. It is the poorest sort of economy to grudge a few cents on a pair of shoes, especially in the light of what has just been said. Yet this is what the quartermaster's department has set out to do, if we may give credence to the reports in the daily press. In response to an invitation for estimates for 25,000 pairs of shoes, Chicago manufacturers offered to furnish army footgear at prices varying from 90 cents to $2 per pair. It is not at

all improbable that the latter figure embraces the cost of manufacture plus a fair profit for shoes that will meet all the requirements mentioned above, while it is just as certain that any figure very much below it does not do so. This is not the time to be cent wise and dollar foolish. A few cents extra expended on a pair of boots may mean a live, fighting soldier in time of pressure and of need, while a 90-cent pair will be very sure to be found bound in tatters on a lamed or dying sacrifice.

A WORD TO MEDICAL GRADUATES.

THE tendency to specialization in every department of life is patent to all, but to none is it more evident than to the bright, wide-awake young medical graduate who has just finished his college work, and is about to step out into active life. He has already noticed in medicine the pressure of competition, the over-crowding in many places, and the difficulty of securing a foothold, to say nothing of a decent livelihood, much less recognition and fame. A specialist seems to have a better chance in every way. There are not so many of them, they command higher remuneration, they sooner come into public notice and become famous. It is not to be wondered at then that so many of our graduates are deciding to be specialists. In this way is most hope of a living, and perhaps fame. And, let us be fair, there is also the fact that there is so much to learn in each department of medicine, that to be able to concentrate all the thought and effort upon one subject strengthens one's confidence in himself, and kindles the hope that he surely can master that one subject. It therefore appeals to him not only as the best thing to do, but the most reasonable thing to do.

While this is all true, are there not some salient facts of the utmost importance that ought to be most carefully considered before making so serious a decision as this must necessarily be? Before one decides to become a specialist ought he not to remember that to be a specialist implies not only that he makes one subject his sole business, but also that he knows all there is to be known about that subject? To limit one's work and attention to one specialty, however, does not make one a specialist. The specialist must know more than is generally known in his line. He must have thought harder and longer, and pushed his investigations farther in that particular line than the general practitioner. He must know more than any or all the books have to say regarding it. And to do this means that he is deeply interested in his subject and most enthusiastic over it for its own sake, regardless of any remuneration or recognition. It will not do then to select any subject; but the would-be specialist must choose that subject he likes most, the one which will prove most fascinating and attractive the more it is investigated. If one would be sure of success as a specialist, he must be deeply and truly in love with his subject, and, forsaking all others, cleave only unto it, for better or for worse, for richer or poorer, in sickness and in health, till death them do part.

Nor is it enough merely to be enamored of some particular subject. The specialist must have the inherent aptitude, the natural gifts that such a subject demands. One may be passionately fond of the violin, and yet it would hardly be wise to spend much time or effort in trying to be an Ole Bull if one had only one arm. So one may be deeply interested in the eye, but if he be lacking in delicacy of touch, or have a beam in his own eye, how can he hope to remove the mote from another's? Each specialty demands certain qualifications which are absolutely essential to success. Of course the beginnings in any line are awkward and clumsy, faculties and powers are brought under control and made more efficient by use; but the point here emphasized is the presence of the faculty or power. Before deciding then upon a particular subject the candidate ought to make sure that he posseses the necessary powers of hand, eye, ear, and imagination which that subject requires. A specialist must not only know what ought to be done—he must know also how to do it. If the choice involves surgical work he must have the inventive faculty and the mechanical skill required by his subject. The specialist has by no means mastered his subject when he knows all that there is to be known about its etiology, pathology, signs, and symptoms. There is still a most extensive and fascinating region unentered—the vast realm of the instruments, appliances, and methods of work. The specialist must be able and willing to ponder over the shape of an instrument or the arrangement of a bandage, as over the effects of a drug,

the healing of a wound, or the symptoms of a disease. Success in many cases turns quite as much upon the skilful use of an appliance specially contrived for that particular case, as upon a clearer insight into the real cause of the trouble. One can scarcely be too careful in this matter, and should be quite sure that he does really possess the inventive faculty and the mechanical skill likely to be necessary.

Not as essential as the considerations already mentioned, but still very important, is the opportunity for practice and personal experience in the chosen subject. A young man must go where he can have an abundance of opportunity for experiment and examination. The specialist must know the theories of his subject, and have his own, too, but far more some practical, personal experience in it. The more the better. Surely, if it is deemed right to insist on so many years preparation for the ordinary practitioner, the specialist needs more. For in proportion as the specialist is required to know more and to be more skilful in his particular field than the general practitioner, precisely will be the need of special study and preparation. If, then, one finds it impossible to go where such opportunities can be secured, or impossible to devote to it the extra time required, he should not persist in his choice.

Just one word more. Do not be overanxious to decide at once. Like taking a wife, the choice of a life-work is a most serious matter. One's taste changes. The darling of twenty may prove to be intolerable at forty years of age. A subject most attractive to you now may, on fuller investigation, develop lines of work not merely distasteful, but positively repellant. The advice once given to a young graduate, who was inquiring as to advisability of taking a hospital here and afterward going abroad, or of going first abroad, still stands the test of experience: Take the work here first by all means,and after a few years you will know better for what you need to go abroad. Yes, and after a few years you will know better for what you are best fitted. Wait patiently for the unfolding of your powers. Wait until you know your own self. Then in view of your own powers, your own tastes, and your own opportunities, choose and decide. Fidelity to such a choice, seconded by industry and conscientiousness, will win and bring its sure reward.

FEDERAL QUARANTINE AND SANITATION.

THE coming summer can hardly fail to bring yellow fever again to our shores; in fact, considering the turbulent times at, and within, our borders we can hardly expect to escape an epidemic unless early and extraordinary precautions are taken. A rigid watch must be kept on favorable points of ingress and modern sanitation must be enforced in all our Southern cities. Unfortunately civic cleanliness still depends upon local enlightenment and legislation and its importance is often realized only after many epidemics, entailing vast losses of life and property. Local ignorance, neglect, or parsimony therefore still leave wide breaches in the strongest bulwark against alien disease. The most we can do is to enact and put in operation laws looking to a prompt and efficient quarantine, and a uniform management of an epidemic should it prevail.

It evidently was with this necessity in mind that Mr. Hepburn introduced in the House of Representatives a bill "amending an act granting additional quarantine powers and imposing additional duties upon the Marine-Hospital Service." In the emergency confronting us we must have prompt and expert assistance, and that we can only get from the Marine-Hospital Service. We must have also authoritative and uniform management of affairs in case yellow fever invades our country and that is possible only by Federal interference. The bill in question endows the Treasury Department with power in times of epidemic to formulate and enforce rules which shall be of national scope and shall be preeminent over all local quarantine regulations. It is in this way alone that uniformity can be attained and uniformity is essential to justice and public safety.

It is only necessary for a measure like this to be proposed when opposition immediately crops out on the ground of the interference with State rights. The opponents of such a law on such grounds should be asked whether they carry their ideas to the extent of allowing States to become centers of infection or public nuisances from the interference with traffic.

The urgency is now too great to allow of creating a Department of Health even if it were desirable and the medical profession can do no better work in this direction than to exert its influence in favor of Mr. Hepburn's bill, known as House Bill No. 4363.

ECHOES AND NEWS.

Issuing of Marriage Licenses.—There has been a bill introduced in the Maryland Legislature regarding the prohibition of marriage licenses to any one suffering from insanity, dipsomania, syphilis, or tuberculosis.

The American Surgical Association; A Correction.—Dr. Claudius H. Masten desires to have it announced that the published report that he had been elected second vice-president of this Association for the coming year is incorrect. Dr. Solon Marx is the second vice-president.

Dainties for Dewey's Wounded.—The Surgeon-General of the Navy has sent one hundred dollars to the Navy Pay Office at San Francisco to purchase clam-juice, lemons, beef extract, and jellies to be sent to the sick and wounded of Admiral Dewey's fleet. The money was contributed by the National Relief Association of the National Society of Colonial Dames of America.

Meeting of the American Gastro-Enterological Association.—At the annual session of this Association, held at Washington, D. C., May 3, 1898, the following officers were elected: President, D. D. Stewart, Philadelphia; first vice-president, Max Einhorn, New York; second vice-president, John C. Hemmeter, Baltimore; secretary and treasurer, Charles D. Aaron, Detroit.

Meteorological Conditions of the Klondike Region.—Some interesting observations on the climate have been made in regard to the Klondike region, particularly at Dawson between August, 1895, and November, 1896. From December 1, 1895 to February 1, 1896, the temperature fell below zero every day. July was the only month in which the mercury did not sink below freezing.

The Marine Biologic Institute of the University of Pennsylvania.—This institution will be opened during the summer, after being closed for five years. It is situated on the shores of Ludlam's Bay, at Sea Isle, N. J. The laboratory will be in charge of Dr. Milton J. Greenman of the university. The intention is to build a floating house-boat of some extent for the accommodation of the students.

The Hospital-Ship "Solace."—The Surgeon-General of the Navy, Dr. Van Reypen announces that the hospital-ship "Solace" is at Key West and that her splendid equipment is ready to give every care to the wounded. Aside from the "Solace," the Navy has at Key West a temporary hospital. It is the purpose of the department, however, to use the "Solace" mainly for the wounded, and to bring them North as fast as their condition will permit, in order to get them out of the Southern climate.

The Title of Doctor in Prussia.—The German universities, with the exception of Fiessen, Leipzig, and Rostock, independently of the Staats-Examen, which alone can give the right to practise medicine, have been conferring the degree of doctor of medicine. So a man could be a doctor of medicine without being legally qualified. But the Minister of Public Instruction has recently put a stop to this practice. No university can grant a degree of doctor of medicine to any one who has not passed the Staats-Examen. This law goes into force October 1st.

New York Train to the Denver Meeting of the American Medical Association.—At the last meeting of the New York County Medical Association, the following Committee on Transportation was appointed to arrange for a Greater New York special train to the Denver meeting of the American Medical Association. Inquiries should be addressed to the chairman or secretary. J. J. A. Maher, M.D., chairman; F. H. Wiggin, M.D.; L. Fisher, M.D.; W. R. L. Dalton, M.D.; A. E. Gallant, M.D., secretary, 60 West Fifty-sixth street, New York City.

The Alphabet Only of the Nervous System Mastered in This Life.—Two veteran neurologists sat talking late into the night of the difficulties and inexplicable phenomena daily presented in their practice, and then the talk diverted to the question of the immortality of the soul. Said one of them to the other, "Do you believe the soul is immortal?" and he replied abstractedly, "I hope so. I would like to exist some time longer. I would like to know more about the nervous system." The plentitude of the ages yet to come seems to be necessary for the neurologist's line of work.

A First-Class Fraud.—A man, short, thick, well-dressed, with stick in hand, about forty years old, has been "operating" Boston for several weeks, till two weeks ago, when, with wife and baggage, he left by the Providence railroad. He presented his card as Dr. C. C. Perry, putting out his sign at 94 Compton street, corner of Tremont, and stated that he had just returned from a visit to Europe. The janitor where he stopped says about forty people have come inquiring after him, some for money borrowed, others for goods furnished on instalments, etc. He has probably transferred his operations to some other large city to the Southward. Look out for him!—*Boston Medical and Surgical Journal.*

Dr. Porro in the Milan Riot.—A cablegram gives the following story about the recent riot at Milan: "The mob did not even respect the hospitals, but wished to invade them, and the Ospedale Maggiore was particularly threatened. Behind the gate at that building stood Professor Porro, a senator and well-known doctor, the most noted conservative in Milan. The crowd was quick to see him. 'There is Porro, our oppressor!' they cried, threateningly. Insults were shouted at the professor, who, pale but calm, resolutely opened the gates and stood with arms folded, saying sternly: 'Let him who has the courage advance. He will find a good revolver ready for him, and I will show how a good physician does his duty.' Nobody accepted the invitation."

The American Gynecological Society. — The next annual meeting of this society will be held at Boston, May 24, 25, and 26, 1898. The meetings will be held at the Hall of the Boston Society of Natural History, corner of Berkeley and Boylston streets. The sessions for the presentation of papers and scientific discussions will be held daily

from 9 A.M. to 12 M., and from 2 P.M. to 5 P.M.; executive session Wednesday 5 P.M. One of the following subjects for discussion will be presented each day: (1) Has Electricity Ceased to Be a Useful Therapeutic Agent in Gynecology? (2) Should Non-Absorbable Ligatures Be Discarded in Gynecological Surgery? (3) The Surgical Treatment of Sterility—How Far Is It Justifiable or Expedient? The program of papers is unusually full and varied.

The Commencement of Bellevue Hospital Medical College.—This institution held its thirty-seventh annual commencement at the Carnegie Laboratory, Monday, May 9, 1898, and sent forth into active professional life 132 graduates. In addition to the above, 160 candidates have passed three or more of their examinations in the following primary subjects: Materia medica and therapeutics, physiology, anatomy, and chemistry. The successful candidates for appointment in Bellevue Hospital are William W. Beveridge, William Martin Richards, William D. Robertson, William Ray Gladstone, Harry Neafie Taylor, Edward Henry Cary, Reginald McCreery Rawls. The graduates with honorable mention and a prize of $100 each are: Samuel Spiegel, William Martin Richards, Samuel Benjamin Yow, Peter Frederick Holm.

Niemeyer's Anecdote about the Ventilating of Vehicles.—In one of his lectures, Niemeyer tells a story of a scene in an omnibus, which hinged on the question whether the conductor should open or shut the windows. On the left was seated a corpulent lady with full face, shrill voice, and labored respiration. The lady on the right was of lean, slender dried-up figure; on entering the omnibus she had coughed; after taking her seat she held her handkerchief to her mouth and fairly changed color when the one opposite wheezing, took her place and called out for "Air, air!" exclaiming she would fairly be smothered if the window were to remain closed. "But I," objected the other, "would get my death of cold if the window were opened." The conductor, who for some time stood undecided what to do, received this piece of Solomonic advice from one of the passengers: "Open the window," said he, in a deep voice, "and then one of them will die; then close it, and the other will die, and so at last we shall have peace."

Climate in the Philippines.—The Philippine Islands are peculiar in having three seasons, a cold, a hot, and a wet. The first extends from November to February or March. The winds are northerly and woolen clothing and a fire are desirable, the sky is clear and the air bracing. The hot season lasts from March to June, the heat becomes oppressive, and thunder storms of terrific violence are frequent. During July, August, September, and October the rain comes down in torrents and large tracts of the lower country are flooded. Manilla, though low, is, broadly speaking, healthy except for smallpox, which flourishes unnoticed in the crowded houses of the lower, half-caste natives and Chinese, and malarial typhoid, which chooses the careless foreign resident for its attentions. The black plague has never reached the Philippines, but cholera used to decimate Manila's native population before a generous benefactor gave the city its present good water-supply system. Since then that dread disease has kept away, and the mortality in that center of 350,000 Malays, half-castes, Chinese, and Europeans does not probably exceed three per cent. per annum.

Diamond Cut Diamond.—The recent death of Sir Richard Quain, who had been what some Americans might call a "hustler," has brought forward the following anecdote of London high-life practice. Dr. Quain, as the *London Practitioner* states it, had in a very high degree the power of inspiring confidence, which is of vital importance in the equipment of a successful city physician. He was a past master in the art of managing patients. There is a legend, however, that he was once driven from the field by a still more consummate artist. A financial magnate of Israel had been suffering for a long time from renal trouble of a grave character, and which it was considered expedient by Quain and other physicians in attendance to conceal from the family. The wife insisted, much to Quain's annoyance, on calling in Sir William Gull, who, she said, would be sure to tell her what her husband was suffering from, which apparently none of the doctors knew. Gull, when interpolated on the subject, replied in his most oracular manner: "Madam, your husband is suffering from a cachexia." "There," said the lady, triumphantly, "I knew Sir William Gull would tell me!"

Protection of the Red-Cross Flag.—The bill passed by the United States Senate two months ago to protect the Red-Cross insignia against use by other associations having a similar purpose has now been favorably reported by the House Committee on Foreign Relations. The text of the bill is the same as that of the measure passed by Congress two years ago, but which failed to receive the President's signature. It would seem to us an advantage if the present measures were amended so as to include protection against mercantile use of the Red-Cross emblem, and we wish that such an amendment might be introduced. At all events, it is essential that the bill to protect the Red-Cross flag be passed at once. The Red Cross is no mere ordinary society; it should be a Government agency, and should receive Government recognition and protection. In other countries agreeing to the Geneva Convention we understand that it has been so recognized. The steamer "State of Texas," which sailed from the port of New York with twelve hundred tons of provisions for the suffering in Cuba, called at Key West last week, taking on board Miss Clara Barton and her assistants. It is awaiting instructions from Admiral Sampson. — *New York Times.*

Prophylactic Gargle in Scarlatina. — The frequency of otitis media as a complication of scarlatina is said to be reduced to a minimum, if several times a day the tonsils and pharyngeal vault be gently brushed with absorbent cotton, wet with the following solution:

℞ Beta-naphthol . . . . . 3 i
Camphoræ } aa . . . . . 3 iv.
Glycerini }
M. Sig. For application to throat.

CORRESPONDENCE.

OUR PHILADELPHIA LETTER.

[From Our Special Correspondent.]

AN ATTEMPT TO ESTABLISH A NATIONAL FORMULARY OF POPULAR PRESCRIPTIONS—ANOTHER INSTANCE OF MILK INFECTION—A MEMORIAL TABLET DEDICATED TO TWO NEW JERSEY PHYSICIANS—TO STUDY THE POLLUTION OF THE SCHUYLKILL RIVER—JEFFERSON MEDICAL COLLEGE'S COMMENCEMENT AND ITS NEW BUILDINGS—DR. SCHWENK ELECTED SURGEON TO WILLS' EYE HOSPITAL—A WARNING AGAINST SMALLPOX BY THE STATE BOARD OF HEALTH—OPENING OF THE PENNSYLVANIA EPILEPTIC HOSPITAL AND COLONY FARM—A "DIVINE HEALER" IN THE TOILS.

PHILADELPHIA, May 14, 1898.

AT the last meeting of the Philadelphia County Medical Society, held May 11th, a report was made by a committee from the Philadelphia College of Pharmacy, advocating the establishment of what may be called a "national formulary," to be prepared by representatives of various pharmaceutical societies of the United States, and having for its purpose the substitution of the so-called "shot-gun" prescriptions marketed by the large manufacturing pharmacists by formulæ which have, by long usage, become popular with the medical profession. Briefly, the stand taken seems to be one of defense on the part of the druggist against the trade-demoralizing influences of the ubiquitous tablet-triturate and like preparations. Dr. F. W. E. Steadman, for the College of Pharmacy Committee, exhibited four preparations of a standard drug obtained from four leading drug-stores of this city, and all unlike both in value and appearance. While disavowing any intention of criticising the value of the combination put up by the wholesale manufacturer, he held that these prescriptions should contain the precise ingredients and in the exact proportion stated by the makers. That wide variations between the actual composition of these preparations and the formulæ printed on their labels does exist to a large extent was further claimed by other representatives of the college, who declared that the great variations, both in the quantity and the quality of the drugs put into these preparations, and the chemical incompatibility of many of the ingredients, was often a source of positive danger to the patient. It was stated that the employment of skilled labor by the druggist ensures to the physician a more accurate compounding of his prescription than could be promised by the wholesale manufacturers, who, it was charged, employ unskilled laborers for the work, and not registered pharmacists, like the drug-stores; the mixing and weighing of ingredients in these factories is done by boys and girls of twelve and fourteen years of age. As a result of such methods, mistakes are bound to occur, with unfortunate results to the patient, to sustain which charge a recent case in court was cited, which involved the sale of 40,000 strychnin pills, where suspicion was raised as to the amount of strychnin contained in each pill, a patient having shown signs of strychnin poisoning after the administration of some of them. Dr. H. A. Hare, in the discussion which followed, said that as modern therapeutics aims at securing the effects of single drugs, prescriptions containing the combination of a large number of different drugs are not in general demand at the present time. He also expressed the opinion that the large manufacturers, with their superior facilities for obtaining pure drugs in large quantities and with the supervision of skilled chemists during the processes of manufacture and assaying, can furnish perfect and reliable prescriptions more cheaply and more certainly than the druggist.

Of the eighty-six new cases of diphtheria reported in this city last week, a large majority were confined to a limited district in Germantown, which had hitherto been considered a healthy locality. Upon investigation of the cause of this unlooked-for outbreak, Dr. Taylor of the Health Bureau, found that the patients had been served with milk from a single dairy, the sanitary condition of which, according to the official report, must have been so bad that it surprised even the stench-proof inspectors. It was found by these gentlemen that the stables and cow-yard of the establishment (which, it should be noted, is situated within the city limits) drained through the open street, past dwellings, by an open gutter, together with, during rains, the overflow of two privy wells, all after a liquid carnival of filth, finally reaching the Schuylkill River by way of the Wissahickon Creek. Is it any wonder that our water-supply is tainted, when such menaces to health exist right under the noses of our accomplished corps of sanitary inspectors? Of course the dairy was promptly closed by the authorities, after their attention was directed to it by the outbreak of diphtheria, but this very circumstance prompts the question, How many more such foci of disease still exist undisturbed within the limits of the city, and how many more outbreaks of diphtheria must be recorded to direct, as in the present and other instances, the attention of the health officials to the condition of affairs, and to induce them to take, as the newspapers delight in saying, "active measures to stamp out the source of the infection"?

The Camden County (N. J.) Medical Society, at its fifty-second annual session, held May 10th, presented to the county authorities a brass memorial tablet in commemoration of the heroic services of Dr. John W. McCullough and Dr. Henry E. Branin during the severe epidemic of typhus fever in the Camden County Almshouse during 1880 and 1881. It may be recalled that Dr. McCullough died during the course of the scourge, and that Dr. Branin's life was shortened by many years as a result of his labors at this time. The principal addresses at the dedication of the tablet were made by Dr. E. L. B. Godfrey, who read a memoir of the deceased physicians, and by Dr. James Tyson, who related some personal experiences of the late epidemic, which he had an opportunity to study, and also spoke feelingly of the unselfish services rendered by the members of the Camden County medical profession at that time.

In order to arrive at, if possible, a final solution of the cause of the pollution of the water-supply of Philadelphia, a committee of the local and State Boards of Health this week began a special tour of investigation of the Schuyl-

kill river, including its tributaries, drains from factories and workshops situated along its course, and other places which are liable to contribute to its infection. A steam-launch has been placed at the disposal of the committee, and they have equipped it with the necessary apparatus for chemic and bacteriologic examination of the samples of water which will be collected at various points along the river, in the hope of locating definitely points of especially serious pollution. It is the present intention to pursue the investigation as far as the city of Reading, some sixty miles up stream, but, if required, the commission will extend their labors to a still more remote point. The following prominent sanitarians constitute the commission entrusted with this work: Dr. George Woodward, of the Philadelphia Board of Health; Dr. A. C. Abbott, Director of the Bacteriologic Laboratory of the Philadelphia Board of Health; Dr. Benjamin Lee, of the Pennsylvania State Board of Health; Dr. R. L. Pittfield, Bacteriologist of the Pennsylvania State Board of Health; John W. Trautwine, Chief of the Philadelphia Water Bureau; George L. Hughes, Chief of the Philadelphia Bureau of House Drainage, and Charles F. Kennedy, Chief Inspector of Nuisances of Philadelphia. At the conclusion of their investigations this commission will report to Councils for the guidance of this body during its deliberations on the question of a new water-supply for the city.

The seventy-fourth annual commencement of the Jefferson Medical College was held in the Academy of Music on May 13th, fifty members of the graduating class receiving the degree of the doctorate from the hands of the Hon. William Potter, President of the Board of Trustees. The opening prayer was made by Archdeacon Cyrus T. Brady of Pennsylvania, and addresses were delivered by President Potter, and by the dean of the college, Professor James W. Holland.

At the conclusion of the present college year, work on the new buildings of Jefferson will be commenced. On ground immediately adjoining the present college buildings, now in the possession of the trustees, a structure extending 118 feet 6 inches on Walnut street, and 107 feet 6 inches on Tenth street, will be erected. The buildings will be of the Italian *Renaissance* style of architecture, of brick, terra cotta, and limestone, five and six stories high. In addition to offices and rooms devoted to the business needs of the institution, the plans provide for an extensive library, museum, and gymnasium, and reading- and lounging-rooms for the students. The larger lecture-rooms, of which there are to be two, have a seating-capacity, one of 400, the other of 300 students; a number of smaller rooms for section work are also provided. The clinical amphitheater seats 520 people, the seats rising from the ground floor to the second story, and the floor space of the whole measuring 76 feet by 21 feet 6 inches. Fronting on Tenth street are the students' laboratories, six in number, each occupying an area of 76 feet by 21 feet 6 inches. A number of other laboratories, for advanced workers and for the use of the members of the faculty and other instructors, are conveniently situated in this section of the building. The dissecting-room measures 64 feet by 46 feet, and is to be provided with every modern improvement as to sanitation and facility for work. The new structure will be completed early in 1899, the work of the college classes meanwhile being carried on in the present rooms of the college which may be undisturbed by the builders, and in the hospital building. As soon as the new college building is finished, the present hospital will be torn down to make way for a more modern and much larger hospital on the same site.

Dr. P. N. K. Schwenk has been unanimously elected an attending surgeon to the Wills' Eye Hospital to fill the vacancy caused by the resignation of Dr. Edward Jackson. Dr. Schwenk has been senior assistant surgeon a the hospital for eight years, and is also one of the attending surgeons on Dr. Harlan's clinic at the Pennsylvania Hospital.

All the local health boards in this State have received an official warning from the State Board of Health against the danger of smallpox, two cases of which disease have recently developed in this city, and a third in one of the western counties of the State. The board lays emphasis in their notice upon the necessity for enforcing vaccination by the local health officials, and also dwells at length upon the importance of careful inspection and supervision of cotton mills, inasmuch as it is believed that the present cases, all in mill-hands, received the contagion by handling cotton which was brought here from infected districts in the South.

The formal opening and public inspection of the Pennsylvania Epileptic Hospital and Colony Farm will take place May 19th. Addresses will be made by members of the medical staff and boards of managers, and by other prominent persons. The hospital buildings were completed last October, since which time final arrangements as to their interior furnishing and other details have been progressing.

"Father" Girand, who posed in this city as a "divine healer" a few months ago, has been arrested on the charge of criminal assault alleged to have been committed by him upon two young girls, his patients at the time of the occurrence. The evidence against this individual seems strong, and, with Archbishop Ryan as the prosecutor, Girand has been held under heavy bail for appearance at court.

For the week ending May 14th, the total number of deaths reported in this city was 430, of which number 134 were of children under five years of age. There were 161 new cases of contagious disease reported, as follows: Diphtheria, 61, with 17 deaths; scarlet fever, 50, with 6 deaths; and enteric fever, 50, with no deaths.

Treatment of Ecthyma.—BROCQ recommends the complete removal of the crusts by means of warm wet compresses or oils, and the subsequent daily application to each ulcerous base of a two-per-cent. solution of silver nitrate, or a one-half-per-cent. solution of chloral hydrate. Tincture of iodine is also of value, followed by the use of the following powder:

℞ Iodoformi . . . . . 3 ss
Bismuthi salicyl. . . . . 3 v.
M. Sig. Apply as a powder.

Regulation of the diet, hot salt baths, fresh air and tonics are generally indicated.

OUR FOREIGN LETTER.

[From our Special Correspondent.]

JENA AS A CENTER FOR MEDICAL EDUCATION—UNIVERSITY STUDENTS FULFIL THEIR ANCIENT USAGE OF "WELCOMING THE MAY" AT 12 P.M. — THE PROCEEDINGS OF THE THIRD SEMI-ANNUAL MEETING OF THE SOCIETY OF PSYCHIATRISTS AND NEUROLOGISTS OF MIDLLE GERMANY—BRACHIAL NEURALGIA DISCUSSED BY PROFESSOR OPPENHEIM OF BERLIN—PROFESSOR SAENGER OF HAMBURG DISCUSSES OCULAR-MUSCLE DISTURBANCES IN HYSTERIA—PROFESSOR MAYSER OF HELDBURGHAUSEN PRESENTS A PAPER ON MANIA—NERVOUS AND MENTAL DISEASES OF WORKERS IN A RUBBER-FACTORY—GOETHE AS A PSYCHIATRIST.

JENA, May 1, 1898.

THE third semi-annual meeting of the Society of Psychiatrists and Neurologists of Middle Germany was held here to-day, Sunday being chosen for the meeting day usually in order not to interfere with the regular work of the professors and privat-docents at the universities, who naturally form the majority of the members of the Society. Under the term Middle Germany is understood practically the Prussian province of Saxony and the Kingdom of Saxony, territory limited enough, but containing the three universities of Leipzig, Halle-Wittenberg, and Jena, besides the city of Dresden, in which, despite the absence of a university, some excellent and progressive scientific medical work is always being done. As the proceedings of the society are usually supplemented by papers from distinguished neurologists from other parts of Germany, they are always of considerable interest to neurologists generally.

Members who came to Jena on Saturday evening for the congress had the opportunity to see and hear the Jena University students fulfil their ancient usage of welcoming the May at 12 P.M., April 30. To the old German song, "'Tis the May," they paraded the streets in hundreds at that hour, while all the town (Jena has but about 12,000 inhabitants to 1000 students) looked interestedly on. The statue of the founder received the usual ovation, and was drenched with beer, each student carrying a mug in the procession for that purpose. Then around the monument to the Jena students who fell in defence of Germany during the Napoleonic wars and the soldier students of 1870–71, they sang *vivas* to Jena and the national hymn.

It was an inspiring moment in the midst of the seemingly utter levity of the occasion. It showed how thoroughly earnest the German character is even at moments when only superficial feelings seem to rule. One could better understand after witnessing the scene the truth of their great Roman historian Mammsen's remark, that the war of 1870–1871 was won at the universities.

But to the Congress. Professor Oppenheim of Berlin read the opening paper on "Brachalgia, or Brachial Neuralgia." In some 200 patients that had come to him during the last three years with the sole complaint of pain in *one* arm, in 15 the cause proved to be vertebral caries, spinal tumor, or tabes; in 30 cases there were the tenderness along nerve trunks, the special points of tenderness that pointed to neuritis of toxic, infectious, or traumatic origin; 6 of these cases followed influenza; 12 of the cases were not long enough under observation to decide whether they were peripheral or central in origin. In 7 cases the neuralgic pains were the so-called referred pains, due in 6 patients to heart affection; in 1 to liver disease. There were 22 cases of genuine neuralgia; that is, of nervous pain, for which no organic cause, central or peripheral in the nervous system itself, could be found. All the rest of the cases, considerably more than one-half the total number, were practically occupation neuroses developing on a hysteric or neurasthenic basis, really a psychalgia, not a local neuralgia.

The discussion, which was prolonged, brought out the generally accepted opinion as to what neuralgia is; that it is, except in a very small proportion of cases, less than one-tenth, either a neuritis or a psychic symptom in neurotic patients, having a local manifestation because of overwork or injury of the part. Genuine neuralgia constitutes a nervous manifestation as yet without a pathologic basis, but the near future and improved technic in the examination of nervous tissue it is expected will furnish this before long. The therapy of the psychalgia is mainly suggestive, and a number o striking examples of its rapid effect were given.

Another paper that was very thoroughly discussed was Professor Sänger's (Hamburg) on "Ocular Muscular Disturbances in Hysteria." Charcot's opinion that the ptosis of hysteric patients is *always* due to spasm of the lids, was considered to be too general. *Nearly all* hysteric ptosis is due to lid spasm, but there are a certain number of cases in which a real palsy exists. Sänger showed photographs of such cases, and Oppenheim, Stentzing (Jena), Bruns (Hanover), and Möbius (Leipzig) reported cases. In the spasmodic cases the symptoms noted by Charcot, *viz.*, the lower eyebrow on the affected side, and certain folds in the lower and upper lids are present; in the paralytic cases these are wanting.

When it came to the question of internal ocular muscle palsy, especially the Argyll-Robertson phenomena, all the cases of it so far reported were considered not to prove that it was ever due to hysteria alone, but that when it occurred in hysterical patients it was due to other causes, especially incipient tabes or brain syphilis. Möbius thought that tabes might exist with this for the only symptom for years. Oppenheim considered that in practically all cases it could be referred to syphilis, this single symptom sometimes remaining after an oculomotor ophthalmoplegia had receded under specific treatment.

Mayser (Heldburghausen) read a paper on "Mania." He showed from statistics how extremely rare it is to see a single attack of mania in a patient whose life is prolonged for any considerable time after the attack. His argument is that the psychic diseases even in their franker typical forms, though these are becoming ever rarer and rarer, are very seldom the acute mental diseases, episodes in life like other diseases, which they are often considered to be. The mental condition that underlies them is permanently pathologic and a single attack of mania, in a lifetime is almost as rare as a single attack of epilepsy, the last being a medical curiosity.

Laudenheimer of Leipzig reviewed the *nervous and mental diseases of workers in rubber-factories, i. e.*, among employees who, in the vulcanizing-rooms, come in contact with carbon bisulphid. The characteristic nervous symptoms are paraparesis affecting the legs and especially noticeable in the peroneal group of muscles. That the fumes of the bisulphid of carbon are often the real cause of the mental troubles noted in rubber-workers he had no doubt. He had seen some forty cases from various factories around Leipzig and only one case of mental disease in a rubber-worker had occurred in a person not employed in the vulcanizing-rooms. From one factory ten employees had been under treatment during the year, and six had exhibited psychic symptoms; all six were vulcanizers.

In nearly every case disturbances of the ventilation of the vulcanizing-rooms, by which the noxious fumes of the carbon bisulphid had been allowed to collect in the rooms in dangerous amounts, had been found. Careful ventilation, it has been discovered, furnishes almost complete protection against the toxic effects of the fumes.

Heredity plays a large rôle in the development of the psychic symptoms in people exposed to the vapors. Very seldom does a case occur without nervous heredity directly or indirectly. The personal idiosyncrasy in the matter is very marked. If employees are not affected at the beginning of the term of service they escape entirely. An individual who develops no symptoms before two months are over is reasonably safe from infection later. No case has been known to develop after two-years' employment. The personal index of mental equilibrium, so important in all mental diseases, is even more noticeable here.

Küstner of Leipzig demonstrated Nissl preparations of the nerve-cells of animals which had been poisoned by carbon bisulphid. All of the nerve-cells were affected, the sympathetic ganglion cells, the cells in the cerebral and cerebellar cortex, the large cells in the anterior horns of the cord, and in the cells of the spinal ganglia on the posterior roots. In all cases where the poisoning had been carried far enough, there was an increased pericellular space, a dislocation of the nucleus, an increase of the staining property of the intracellular substance, and an irregular distribution of the Nissl bodies within the cells.

Professor Stentzing of Jena demonstrated the nervous cells of a case of tetanus, also prepared by Nissl's method. The degenerations in this case, an extremely rapid fatal case, were much more pronounced than the only other case of tetanus in which Nissl preparations have so far been made, that of Professor Goldscheider at Berlin.

Professor Möbius of Leipzig read a paper on "Psychiatry as Goethe Had Studied It in Certain of His Famous Characters." Goethe had once refused to visit with the Grand Duke of Weimar the very insane asylum in which this Congress was being held, because he said he found plenty of fools to study in ordinary life without having to seek them out in an asylum. How much he had profited by his studies in real life, to get at the real essence of the pathologic in mental symptoms long before the profession had properly grasped them, his portrayal of the characters of Werther, Gretchen, Mignon, Benvenuto Cellini, and especially Tasso amply prove. An analysis of this last character formed the basis of the paper. The drama was really a study of paranoia long before the word had been coined or the idea of it realized. It had been grasped all unconsciously perhaps by the poet's genius and crystallized in perfect literary form for immortality.

TRANSACTIONS OF FOREIGN SOCIETIES.

London.

THE VAGUS ORIGIN OF ASTHMA AND ITS TREATMENT—OSMIC ACID INJECTED TO CURE NEURALGIA—SARCOMA TREATED BY COLEY'S FLUID—INTERSCAPULOTHORACIC AMPUTATION—ADVANTAGES OF GLEOSIGMOIDOSTOMY—DIPLOCCOCUS FOUND IN ACUTE ASCENDING MYELITIS—EXPERIMENTS WITH COBRA POISON—MENSTRUATION OF MONKEYS AND THE HUMAN FEMALE.

AT the Medical Society, March 28th, KINGSCOTE read a paper on *the vagus origin of asthma and its treatment*. It is pretty generally conceded, he said, that the origin of asthma is to be found in the irritation of one or several of the many ramifications of the vagi. Whether it be from the origin in the medulla or from Meckel's ganglion, as in hay fever, or from the superior laryngeal, from ear mischief, through Arnold's nerve, or through the recurrent laryngeal, or through pressure on the main trunk in the neck, or through irritation of the heart, lungs, stomach, liver, spleen, bowels, or sympathetic system, it is difficult to evade vagus origin. There is only one known means of artificially producing asthma. If we chloroform a dog and divide the left vagus and gently stimulate the proximal end with electricity we produce asthma in the right lung, and tonic contractions of the right half of the diaphragm. In addition to these ascertainable causes of vagus origin there still remains, however, a large class of obscure cases whose origin is not ascertainable as yet. Thus, in treating chronic heart-lesions Kingscote noticed that an accompanying asthma of unascertainable cause was frequently cured. These patients were invariably found to have a deep-seated dilatation of the heart. When this condition improved the asthma disappeared. Considering that a dilated heart when distended with blood weighs about half as much as a bucket of water it is not surprising that in the supine position the organ can make considerable pressure upon the vagi, and by its pulsations hammer their nerves against the spine.

There are two obvious criticisms of this theory which naturally occur: (1) If these things be, why are these cases not oftener diagnosed? and (2) why do not all persons with heart dilatation have asthma? They are not often diagnosed, because in asthma of long standing there is usually a large amount of emphysema, which makes accurate percussion of the heart's margin very difficult. The asthma need not occur where the dilatation is very great, for the heart flops over on either side of the bony spine and thereby assumes a hollow conformation imme-

diately over it, by which means perhaps the vagi escape pressure.

The speaker's method of treatment in these cases of asthma, combined with cardiac dilatation, consists in a modification of the Schott treatment with the inhalation twice daily of free oxygen gas. The gas seems to relieve the paroxysms by supplying the oxygen of which the system is in need.

WILLIAMS said he was not convinced that the pathology of asthma described by the speaker was correct. He thought that the posterior pulmonary plexus was principally affected, and that this plexus contained sympathetic and spinal filaments as well as vagus fibers. Neither did he take so gloomy a view of the administration of medicine for the relief of asthma. Iodid of potash in 10-grain doses three times a day is often of great benefit.

MAGUIRE thought that the view that asthma was due to spasm of the muscles of the bronchi was a pure assumption. It was difficult to believe that such spasm could be so universal or so prolonged as it was in many attacks of asthma. In cases of spasmodic asthma there were, first, sudden dyspnea coming on early in the morning, then ineffective cough, and later expectoration of tenacious mucus often containing Curschmann's spirals. There was evidence of congestion, if not of inflammation, of the mucous membrane. Attacks similar to these were seen affecting the larynx in the "false croup" of children in which the larynx could be seen by actual inspection to be congested. The value of antispasmodic remedies could be explained by their action on the muscularis mucosa rather than on the circular muscular fibers.

MORRISON thought the vagus theory of Kingscote untenable on anatomic grounds, yet a neurotic reflex causing dyspnea might arise from various organs. As examples he mentioned the effects of gastric and intestinal catarrh, and cardiac dilatation. Groedel of Nauheim advocates the use of baths in the treatment of dyspnea primarily dependent upon the state of the heart, and that in which the heart is secondarily affected in consequence of emphysema. Cases of so-called idiopathic asthma are however not suited for the Nauheim bath treatment.

At the session of April 4th, TURNER showed a woman, aged thirty-three, who had for two years an *obstinate neuralgia of the infra-orbital nerve.* Before exploring the antrum as a preliminary, if necessary, to the removal of the Gasserian ganglion, he injected a one-per-cent. aqueous solution of osmic acid into the infra-orbital nerve by passing an ordinary hypodermic needle into the infra-orbital canal. Considerable pain and tenderness resulted, and when in the course of ten days this passed away, the patient had lost the pain, which had not since returned. He suggested that the nerve-fibers were destroyed by the acid. For this purpose an aqueous solution is preferable to one in glycerin.

RICHARDS doubted whether the acid penetrated the neurilemma and was disposed to attribute the relief to the effects of a transitory traumatism.

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At the Clinical Society, March 25th, BARLING read an account of two cases of *interscapulothoracic amputation for sarcoma of the humerus.* Both patients recovered from the operation. In one the growth recurred in six months, but in the other there was no recurrence at the end of fifteen months. In each case the axillary vein was ligatured through the anterior flap instead of being tied as was the artery in the third part of the subclavian. Otherwise the operation was performed as recommended by Bèrger. The mortality of this operation is slight. Nineteen cases have been recorded since 1890, and in all of them the operations were successfully performed.

BIDWELL related a case in which he had performed *ileosigmoidostomy* in order to close an artificial anus at the umbilicus. The colostomy was of the transverse colon and had been performed on account of a stricture in the splenic flexure. The ileum was united to the sigmoid flexure by lateral anastomosis according to Halsted's method. After the operation about one-half of the feces passed per rectum, and the remainder by the colotomy opening. Two months later, in order to drain the whole of the contents through the anastomotic opening, the abdomen was reopened and the portion of the ileum between the cecum and the anastomosis was divided transversely, and the two ends were invaginated on themselves. This procedure was completely successful.

This operation leaves the patient in a much more comfortable position than does a colostomy. It is, therefore, to be recommended in cases of irremovable tumor of the ascending or transverse colon.

BUZZARD and RUSSELL related a case of *acute ascending myelitis* in a man aged thirty-six years. Numbness and weakness commenced in the feet and spread rapidly up through the legs into the trunk, and into the arms. Control of the bladder was lost, and there was slight difficulty in swallowing. The temperature rose to 102° F., then to 103° F., respiration became feeble, edema of the lungs set in, and death followed six weeks from the time of the first symptom. At autopsy there was found a marked meningomyelitis, most intense in the lumbar region. A diplococcus was found in the exudation of the meninges, and in the substances of the cord. There were many points in common between the diplococcus and that described by Weichselbaum, but in the present state of knowledge of this subject the speakers hesitated to express an opinion as to the relation of this diplococcus to the disease.

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At the Obstetrical Society, April 6th, HEAPE read a paper on *the menstruation and ovulation of monkeys and of the human female.* He is of the opinion that the menstrual process is practically identical in women and in female monkeys. He pointed out that although monkeys menstruate all the year round they (at least some of them) are fertile at only certain times of the year and thus occupy an intermediate position between the lower mammals and the higher primates. He believes that the histologic homology of "heat" and menstruation will be established. He combated the view that in the lower animals "heat" is brought about by ovulation or that the ovary is the seat of stimulus which induces "heat." He urged that both menstruation and ovulation are closely connected with congestion and that in the primitive condition they are both due to the same cause. His conclusions were that in women and female monkeys ovulation and menstruation are not necessarily coincident; that menstruation may take place without ovulation, and that in women ovulation may occur without menstruation.

SOCIETY PROCEEDINGS.

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DR. JOHN F. ERDMANN: This appendix was removed from a medical student twenty-one years of age. The history of the attack is rather peculiar. He was taken ill on Saturday three weeks ago. I saw him at 1.30 P.M. He then had very acute pain, rather cutaneous than deep-seated, extending from the ninth costal cartilage down to Poupart's ligament. This area was so sensitive that the slightest touch caused the patient to cry out with pain. There was also deep-seated pain from the lower border of the twelfth rib to the crest of the ilium posteriorly. His temperature was 102° F., and his pulse 116. There was no rigidity of the rectus muscles on either side, no pressure point (McBurney's), and no mass could be felt anywhere. I saw the patient again at six o'clock, and found the condition the same. At eight o'clock I operated, and found an appendix with two perforations and partly gangrenous. An enterolith was found in the base of the appendix. An extensive dissection was done, the entire mass tied off, and the wound drained. On the following morning the temperature was 99.5° F., and the pulse 94. In the afternoon the temperature was 101.5° F., and the pulse 120, the symptoms pointing to a condition of profound sepsis with a grave outlook. At nine o'clock that night the condition was just the reverse, the temperature being 99.5° F., and the pulse 104. Since then the patient has made a good recovery.

The next appendix was removed two weeks ago, during the patient's fourth attack. The first three attacks were very mild, none being severe enough to cause confinement to bed. When I first saw the patient there was a slight amount of parietal rigidity, some cutaneous sensitiveness, and the usual pressure-point was present. He was removed to St. Mark's Hospital, where an operation was performed. A clean abdomen was found with no evidences of the former attacks which had occurred within a year or eighteen months. The veins and arterioles were tortuous and dilated, but the appendix otherwise appeared to be healthy. Upon grasping it, however, I felt small, hard bodies within it, which proved to be enteroliths. There were six of them, each about the size of a grain of wheat. Four points of ulceration were found inside the appendix. The patient recovered, and returned to his home at the end of ten days.

This third specimen is a stone which I removed from the junction of the cystic and hepatic ducts. In January the patient had an attack of pain in the abdomen which was relieved by mild remedies. A second attack occurred in March, the pain being just below the ensiform cartilage. The pulse was 112, and the temperature 104° F., and the patient was considerably jaundiced. The temperature and pulse soon went down, but three days later had again become elevated. A longitudinal incision was made along the border of the right rectus muscle, but as this was not large enough, I opened across to the left rectus in order to reach the duct, which was bound down on that side by adhesions which had formed at the time of the previous attack. The mass discovered resembled a new growth. Search was made for a stone, but none found until just as I was about to close the wound, when one was discovered at the junction of the cystic and hepatic ducts. It was displaced into the gall-bladder, from whence it was removed. Owing to the adhesions, suture of the gall-bladder to the parietal peritoneum was impossible, but the sac was grasped with a pair of Halsted forceps and drawn up as close to the abdominal wound as possible, and held there with gauze pads. The patient made a perfect recovery, both the longitudinal and transverse incisions healing primarily and the sinus closing within five weeks.

DISCUSSION.

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Bellevue I once saw one which measured eleven inches. I have seen but one case in which there was supposed absence of the appendix. Close examination, post-mortem, will usually show the presence of a small, rudimentary appendix in cases in which it is believed to be entirely absent.

DR J. RIDDLE GOFFE: It is interesting to note what Dr. Erdmann has said about the average length of the appendix. This seems to vary greatly. I have removed two which were about five inches long, and in performing laparotomy I have seen appendices which were so long that they reached down over the brim of the pelvis. They were not diseased, so they were not removed. I do not consider five inches an unusual length.

In regard to the case in which there were several points of ulceration, it is astonishing to what an extent ulceration will go before marked symptoms appear, as shown by the following case: Two weeks ago a young unmarried woman was seized with sharp pain in the abdomen while she was at a lunch-party. This was the first indication of appendical trouble. She promptly rallied from this attack, and although operation was considered, it was postponed for more positive indications. When the operation was performed two days later, the appendix was found gangrenous in nearly its entire length. The intestine was also involved, and there was a general septic condition of the peritoneum. The case was hopeless, of course, and the patient promptly died.

DR. J. H. FRUITNIGHT: Speaking of long appendices, I would remind the members that Dr. Grauer once presented to this Society an appendix thirteen inches long which had been removed post-mortem.

A CASE OF DIPHTHERIA.

DR. ROBERT MILBANK: I have a case to report which is interesting as showing rapid recovery from diphtheria after the use of antitoxin in spite of the fact that it was employed some days after the beginning of the disease. At the last meeting of this society I was called away to see a child, seven years of age, who had been for some days under the care of a homeopathic physician. I found the child with a temperature of 103° F., a pulse of 130, and the fauces covered with diphtheritic membrane. The larynx was not especially involved. I at once consulted our friend Dr. Dillon Brown and upon his advice administered 5500 units of antidiphtheritic serum. On the following morning the child was much better. The next day 2000 units of the serum was given, and an additional 2000 on the succeeding day, 9500 units in all being administered. The child seemed to improve after the first injection and soon recovered, the temperature not rising above 100° F. after the second day. The albumin rapidly disappeared from the urine and the membrane was all gone after the fifth day.

CATARACT.

DR. E. S. PECK: These two specimens are interesting as showing two widely different forms of cataract. The small white one is calcareous and was removed from a man twenty-seven years of age. The second is a ripe cataract and was removed from a man eighty-two years old. Both patients were in first-class hygienic environment, and both were operated upon in October, 1897, within two days of each other.

The first case is unusual as the patient was a deaf-mute and also because the lens was dislocated. He was brought to me having, as was supposed, a large drop of pus in the right eye which had suddenly appeared on the previous day. I found that the white substance was a hard body, that it was in the anterior chamber, and that it followed the movements of the patient's head. It was diagnosticated as a dislocated calcareous cataract, which must have formed a long time before. The man's history was rather interesting. He was born with all his faculties, but in his third year had a severe attack of cerebrospinal meningitis which left him a deaf-mute and with a white speck in the right pupillary field. The latter caused no symptoms except almost total loss of sight until recently when the eye became painful on account of the presence of the hard white body in the anterior chamber. It is probable that the dislocation of the lens into the anterior chamber occurred on the day mentioned, and, although the idea may be ridiculed, I think it was caused by a violent attack of coughing. Extraction was performed without difficulty and healing occurred without accident. Later the ophthalmoscope revealed two large plates in the choroid, showing that the cataract was the result of a calcereous deposit of lime, a manifestation which occasionally follows cerebrospinal fever. The case is unique on account of the unusual cause of dislocation of the cataract and because of the fact that the patient was a deaf-mute. In addition the small size, white appearance, and stony feel of the cataract are in striking contrast to the large size, brown color, and semi-solid consistency of the senile cataract.

DR. JOHN F. ERDMANN then read the paper of the evening, entitled

HEMORRHOIDS AND THEIR TREATMENT,

which will appear in a future issue of the MEDICAL NEWS.

DISCUSSION.

DR. R. C. M. PAGE: It seems to me that if we consider hemorrhoids as a symptom rather than a disease, we can more intelligently apply treatment. For instance, in nearly all cases we find that hemorrhoids are due to obstruction of the portal circulation, and if this obstruction be due to some chronic disease of the heart or to chronic atrophy of the liver, we will find the hemorrhoidal condition very difficult to manage. I doubt if anything short of operation will accomplish anything. If, however, we have an obstruction which is only temporary, the hemorrhoids will disappear under proper treatment. For example, a young man applied to me some years ago for relief of a hemorrhoidal condition which was undoubtedly due to excessive eating and drinking during the holidays by one who was usually temperate. I found him in a very bad condition, there being a tremendous projection of the bowel from the rectum. The gut was almost black and several points of ulceration were to be seen. I gave him a good dose of calomel, followed by castor oil, and

sprinkled the ulcerated parts with a powder of bismuth and opium. It was impossible to replace the mass. The patient was seen by the late Dr. Sands, who advised immediate operation. The young man, however, begged not to be cut, saying that he had once before had a similar condition from which he recovered. So it was decided to wait. No operation was performed, for by alternately irrigating the parts with tepid water and keeping them dusted with the bismuth and opium powder, stopping the use of alcohol, but allowing the patient a nutritious liquid diet, I was able to replace the tumor at the end of four or five days, and within ten days the young man was perfectly well. Ever since then I have thought that I would never again be in a hurry to operate in such a case. Last January I saw a patient who had a similar condition. It was impossible to replace the tumor when first seen, but it entirely disappeared after a week of palliative treatment. Much can be done in these cases to reduce the hemorrhoidal tumor by regulating the diet.

DR. FRUITNIGHT: In regard to simple incision of the thrombotic variety of hemorrhoids, my experience confirms what the author has said about the tendency of the tumor to refill. This has happened several times in my practice, and I now invariably excise part of the skin. The old nut-gall ointment combined with extract of belladonna and opium as a local application, together with the use of Van Buren's old prescription

Lac sulphur. Potassæ bitartrat.	aa	℥ ii
Pulv. buisi		3 ii

to keep the bowels open, will generally relieve mild cases.

In regard to the skin-tab or itching pile, when the patient will not consent to removal, I have employed with good results applications of a twenty-per-cent. white precipitate (mercurial) ointment. Strict attention should be paid to the diet and the habits of life should be regulated.

DR. MILBANK: I have employed Whitehead's operation in a great many cases and with most satisfactory results. There are some objections to it, particularly the difficulty of maintaining asepsis, although this may be overcome by frequent irrigation after operation. Its advantages are that it is unnecessary for the patients to remain long in bed—not longer than three days—and there is very little pain after its performance. In young people recovery is uncomplicated. I have performed the operation upon two old patients, the first being a woman aged sixty-five years, who had suffered from hemorrhoids during many years. She remained in bed only four days. The second case was complicated by extensive prolapse of the rectum. The patient was obliged to replace the bowel several times a day. He dreaded operation, and put it off from year to year, but finally submitted to it six years before his death at the age of sixty-six years. He made a rapid recovery, being up on the second day and out of the house on the twelfth. To my mind, however, the Whitehead operation is justifiable only when the case is a very bad one. I have never seen it followed by a rise of temperature.

DR. S. N. LEO: I have seen a great deal of rectal trouble among old people in the institutions with which I am connected. I relieve most of the cases by surgical procedures, but I think that a great deal can be done by medicinal treatment and regulation of the diet and bowels. Pulna water (domestic, not the imported) gives good results in cases of this kind.

DR. S. H. DESSAU: I can add nothing to the paper except a word, perhaps, in regard to the etiology of the condition. I am convinced that a very important factor in the causation of hemorrhoids is the chronic intestinal indigestion to which adults seem to be so liable nowadays. It has been noted by a number of surgeons that hemorrhoids have been more commonly seen during the last few decades than ever before. Chronic intestinal indigestion has also been more frequently encountered during this same period.

DR. A. M. JACOBUS: From a surgical standpoint the author has covered the ground very thoroughly in his most practical paper. I desire, therefore, merely to allude to a remedy which has proved very useful in my hands in the treatment of hemorrhoids; but first I wish to emphasize the importance of teaching our patients how to defecate. A large proportion of women, as we find in gynecologic practice, go to the closet only once or twice a week, and even then never completely empty the bowel but only pass hurriedly such small scybalous masses as may be in the lower rectum. The fact must be impressed upon them that they should go to the closet every morning and at such other times as there may be the slightest desire, thus forming a habit of regularity, and at the same time they must be urged not only to empty the lower bowel but to take time enough to wait for the second desire and thus pass the feces which subsequently pass down from the upper rectum after the first discharge. To relieve straining they should pass into the anus some lubricant such as vaselin, lard, etc., on arising each morning and again just before the call to defecate. A remedy which I have found useful as a local application for hemorrhoids is an ointment consisting of 2 drams of ichthyol to an ounce of lanolin. A small mass of this, the size of a grape, passed up the anus three times daily, acts like a specific in many cases. In this connection I will add that Dr. L. D. Bulkley recently told me that for some time past he has prescribed ichthyol by the mouth, 10 to 15 drops, in capsules, three times daily, and declared that this, through its action on the liver and intestines, will cure nearly every case of hemorrhoids. In fact, he looks upon its internal use as a specific.

DR. PECK: I would like to ask the author of the paper if Krüll's method of flushing the lower bowel, which came into vogue some years ago, is not a good means of relieving pressure on the hemorrhoidal veins.

DR. GOFFE: In examining patients per rectum I do not employ the rubber finger-cots, as suggested by the author, because I find them annoying. I am in the habit of covering the examining finger, and, indeed, the whole hand, with balsam of Peru in order to protect it. It also forms an excellent lubricant.

In treating hemorrhoids we must carefully differentiate the various degrees of involvement from simple conges-

tion to the extreme condition described by the author. The milder forms can be relieved by regulating the diet and habits. Glycerin and gluten suppositories have proved useful in my hands in relieving the constipation. Horseback riding is an old remedy which acts well in some cases, but I have been told that hemorrhoids are of frequent occurrence in men who ride a good deal. On the Western plains it is said to be a common complaint both among cowboys and cavalrymen.

In regard to the method of dilating the sphincter, I use the two thumbs instead of pushing in first one finger and then another, for I find that I can pull down and roll out the mucous membrane to a greater extent in this way, which is also Nature's method. With the hands on the tuberosities, the floor of the pelvis is readily drawn down and converted into a cone by the thumbs in the anus.

Of the various surgical procedures recommended by the author, I usually employ the Whitehead operation, which I prefer to the clamp or ligature, and I am glad to know that others are of my opinion. I frequently see cases in which the extensive involvement calls for it, and I have never known infection to follow the operation. My plan is to wash out the rectum with a bichlorid solution and to pass a tampon up into the rectum before beginning the operation. In doing this operation, however, the possibility of the bowel retracting and healing by granulation, thus producing a stricture, should be borne in mind. This happened in one of my cases, and the man was so indignant that he disappeared before I had time to ascertain how extensive the stricture was. Now, in order to avoid this, I am always careful to dissect out the rectum high up—fully two inches above where I cut it off. This removes the strain and relieves the tension upon the sutures. Primary union then follows, and a smooth orifice is the result. I have also used the clamp and cautery with satisfaction. In one or two instances I have found that in separating the blades of the clamp after using the cautery the tissues adhere to the blades and the wound is torn open, thus occasioning considerable hemorrhage. Since then I have been careful to separate the tissue from each blade of the clamp as it is opened and find that the cut edges adhere together, and thus avoid any raw surface.

DR. LEE: I have very much enjoyed the paper and the discussion. The subject has been well covered, but there is one way of treating a large hemorrhoid which has not been referred to, *i. e.*, dividing it into quarters by transfixing it with a double-threaded needle, tying off each quarter, and this without incising the skin at the base, as is usually done. I find that a large hemorrhoid can be very much better controlled in this way than by a single ligature. There is less pain and healing is rapid. I do not employ general anesthesia, but merely inject the tumor with a solution of eucain or cocain.

DR. GOFFE: There is a little maneuver which has served me well in replacing large hemorrhoids which have become strangulated. I make the patient bear down as hard as possible while I press the tumor up into the rectum. The patient's efforts will cause the sphincter to relax.

DR. ERDMANN: The point just brought out by Dr. Goffe is also true in strangulated hernia.

In answer to Dr. Page, of course if we can treat the cause we will cure the hemorrhoidal condition without operation. There is no doubt that these affections are often due to obstruction of the portal circulation. As to local applications, Goulard's extract and cherry-laurel water applied on a cloth at night will often relieve the pruritus.

I am surprised to hear Dr. Milbank say that he allows his patients out of bed on the third day after a Whitehead operation. I would not think of letting a patient up so soon. Perhaps it is because I have seen several cases of stricture follow this operation, which, by the way, I never employ unless a large area is involved.

In regard to Dr. Goffe's use of balsam of Peru on the examining finger instead of the rubber finger-cot, I have found that the balsam produces considerable smarting if there is any abrasion of the skin. Patients, too, complain that it causes smarting and burning about the anus which lasts for hours.

I have not found that any particular degree of pain follows the ligation of hemorrhoids. The method employed by Dr. Lee of quartering the mass is nothing more than a modification of Allingham's operation. Personally, I do not like it. It is better to dissect the skin off the pedicle. After this operation the patient may be allowed out of bed on the second day.

DR. R. A. MURRAY: I have found that the replacing of a hemorrhoid is much facilitated by putting the patient in the knee-chest position. I have also used the chlorid-of-ethyl spray as a local anesthetic when operating upon hemorrhoids when the patient refuses to permit me to inject a solution of eucain or administer a general anesthetic.

DR. ERDMANN: In regard to the knee-chest position, I have lately been using the Kelly proctoscope, and find that when the patient is in that position not anesthetized it is almost impossible to insert it; whereas when the patient is on the back its introduction is easy.

In ligating hemorrhoids under local anesthesia I nearly always spray them with chlorid of ethyl before inserting the needle.

REVIEWS.

THE ELEMENTS OF CLINICAL DIAGNOSIS. By PROFESSOR G. KLEMPERER, Professor of Medicine at the University of Berlin. First American, from the seventh (last), German edition. Authorized translation by NATHAN E. BRILL, A.M., M.D., Adjunct Attending Physician, Mount Sinai Hospital, New York City, and SAMUEL M. BRICKNER, A.M., M.D., Assistant Gynecologist, Mount Sinai Hospital, Out-patient Department. New York: The Macmillan Company, 1898.

THE fact that Klemperer's "Clinical Diagnosis" has in seven years reached as many editions is an excellent proof of its value and of the demand by the profession for a work of this kind. It is therefore surprising that its

translation into English has so long been deferred. Drs. Brill and Brickner are to be congratulated for giving this book to the English-reading student and physician, and also for the admirable manner in which their work has been accomplished. In the translation, the original style and diction have been faithfully followed, as far as possible, and nothing has been amended, added, or omitted. The book is the best one of its kind published, and on every page the ripe and mature impress of a scientific and well-grounded clinical experience can be discovered. All the modern methods of examination necessary to a complete and scientific diagnosis are recognized, and each subject receives the consideration which its importance merits. The excellent scheme for examination of the patient which has long been in use at the Charité in Berlin, receives the first consideration. Following this is a chapter on the general condition of the patient, which contains many valuable hints in diagnosis. Chapters II. to XIII. are devoted to the diagnosis of the acute febrile and acute infectious diseases, diseases of the nervous system, diseases of the digestive system, diseases of the upper-air passages, diseases of the respiratory tract, diseases of the circulatory system, examination of the urine, diseases of the kidney, disorders of metabolism, diseases of the blood, animal and vegetable parasites, and the Röntgen-rays as diagnostic aids. The last-named chapter is a new addition to the work. In every chapter the special symptomatology of each disease is considered, which adds greatly to the usefulness of the book. We are thoroughly in accord with the translators' plan of adhering to the original technical terms and Latin names, and this plan will be of immense service to those physicians who intend taking courses in any of the German clinics.

The book is a veritable store-house of useful methods in clinical diagnosis, and a full description of all the chemic, microscopic, and bacteriologic technic necessary in clinical medicine is clearly and concisely stated. We are amazed at the amount of practical information contained in something less than 300 printed pages. The book is of a convenient size for the pocket, is well bound and printed, and contains sixty-one illustrations and an adequate index.

We cordially commend it to all teachers and students in medicine as a thoroughly safe and valuable book on clinical diagnosis, and we also congratulate the publishers and translators for a most useful contribution to English medical literature.

INCOMPATIBILITIES IN PRESCRIPTIONS. By EDSEL A. RUDDIMAN, Ph. M., M.D., Adjunct Professor of Pharmacy and Materia Medica in Vanderbilt University. New York: John Wiley & Sons, 1897.

IN this work Dr. Ruddiman has presented, in alphabetical form, the more common incompatibilities occurring when the drugs ordinarily employed by physicians are combined. In the form in which the book is written reference to any drug is convenient and easy. The second part of the book contains a long list of prescriptions whose ingredients are wrongly combined for the training of the medical student and the student of pharmacy.

We have no doubt that Dr. Ruddiman's work will have a ready sale, since it is eminently practical, easy of reference, and because few physicians have the opportunity of practical work in pharmacy which would enable them to know as well as the pharmacist what drugs are incompatible with each other.

A SYSTEM OF MEDICINE. By many writers. Edited by THOMAS CLIFFORD ALBUTT, M.A., M.D., LL.D., Regius Professor of Physics in the University of Cambridge, etc. Vols. I., II., and III. New York and London: The MacMillan Co., 1897.

THE tardy appearance of the review of this important work in the MEDICAL NEWS is unfortunate as it is unavoidable; for through no fault of the reviewer the readers of this journal have not been made acquainted with the virtues of this excellent system. One needs but to consider the list of contributing authors to become aware of the superior merit of the monographs comprising the work, which is at once complete and scientific. The editor, moreover, has accomplished his harmonizing work in a remarkably adroit manner, and, although external evidences thereof do not appear, this much is clear, that the usual faults of contradiction and overlapping are absent. The work is marked by a breadth and comprehensiveness which stands in marked contrast to the ordinary medical writing, and takes this fundamental note, perhaps, from the introduction to the first volume, written by the editor. This is not only a master-piece of medical thought and of depth of knowledge, but is marked by elegance of diction and strength of purpose. It is medical, biologic, philosophic, and classic all at once, and he who reads it must of necessity have a broader view of medical science.

Vol. I. is divided into two parts. The first division, under the title prolegomena, deals with general themes related to internal medicine. The treatment of the individual articles is broad, and their contents useful. Among the subjects discussed are medical geography, climatology, aerotherapeutics, hydrotherapeutics, electricity, dietetics, massage, medical statistics, inflammation and its relations to fever, the pathology of disturbed nutrition, and the general pathology of new growths. In the second part of this volume fevers are considered. Insolation is separately described, and is followed by a chapter on the individual infectious diseases. The articles are all modern, and where new discoveries have been made since the publication of this volume they are noted in Vol. III., as is the case with the serum diagnosis of typhoid fever, the recent outbreak of the plague, and the newly discovered bacterium of yellow fever.

Volume II. deals with gynecology, and the editor has availed himelf of the services of Dr. W. S. Playfair as the co-editor of this volume. This volume offers within its 973 pages a complete treatise on the diseases of women. It is progressive, recent in its nomenclature and expression of opinion, and unhesitatingly decries obsolete and useless measures of therapeutics. In this it is unique, that it does not mention many remedial measures, leaving the choice to the confused reader; but it states emphatically what is the best recognized procedure for each particular

ailment. Chief among the notable articles are the ones on the anatomy of the female pelvic organs, gynecologic diagnosis, the relation of the nervous system to the etiology of gynecologic diseases (by Playfair), displacements of the uterus, extra-uterine gestation, the diseases of the bladder and urethra. All gynecologists will not agree with the author of the chapter on electric treatment, who is something of an optimist, and here and there are to be noted other mooted points which are stated with dogmatic earnestness; but this does not vitiate the value of the book, for it is but the expression of individual opinion, and, usually, very high opinion. We may conclude the consideration of this volume by saying that it is an up-to-date, classic text-book of gynecology, replete with good things and practically with no blemish.

Volume III. deals with infective diseases of chronic course, diseases of uncertain bacteriology, subdivided into the endemic and non-endemic varieties, the infective diseases communicable from animals to men, the diseases due to protozoa, the intoxications and internal parasites. Here again, the broad comprehensiveness of treatment appears and makes what is frequently dull reading a pleasure. Under the treatment of tuberculosis, however, no recognition is given, nor is mention made, of the various serums and tuberculins which have been vaunted as curative agents. Leprosy is not deemed contagious; its communicability by contagion is, at least, not considered proven. Constitutional syphilis (Jonathan Hutchinson) and the "Co-existence of Infectious Diseases" (Dr. Caiger) are significant chapters, the former, especially, being brimful of suggestion and valuable consideration. The articles on endemic diseases are written for the most part by men who have lived in the tropics, and their discussion is preceded by a chapter on the climate and some of the fevers of India.

Glanders and farcy, vaccinia, foot and mouth disease, rabies, and glandular fever are next described. Under vaccinia are considered vaccinal eruptions and complications, vaccinal injuries, alleged and real, and the appearance of syphilis after vaccination. This chapter is concluded by a discussion of the relation of vaccination to various diseases in which the writer takes the ground that direct communication of bacterial diseases is possible when the operator is careless or when the materials employed are not properly prepared. Malarial fever is discussed by Dr. Osler, and is illustrated by two beautiful plates showing the parasites of the tertian and quartan types and the organism of estivo-autumnal fever. There is little that is new in this article, but it bears the usual mark of scholarliness and of perfect writing which we have learned to expect from this teacher.

The intoxications, vegetable and mineral, including opium, alcohol, cocain, haschisch, and ether poisoning, are fully described. Several of these articles are from the pen of the editor, and he has adduced much that is new and interesting concerning these conditions. The volume is concluded by a chapter on the internal parasites of man.

This cursory view of these superb volumes must suffice for the present. It has brought to light but few of the many excellencies of this remarkable work. As far as the writer's knowledge extends, no English system has ever been published which has an array of contributors so famous or a list of monographs so valuable. It is almost puerile to say that the work forms a decided addition to medical literature; it is medical literature; and other systems published in time to come must be modeled from it to hold an equally high place. The books are handsomely printed on heavy paper, the illustrations are numerous and apt, the indexes of authors and subjects are complete and make reference easy.

THERAPEUTIC HINTS.

Treatment of Painful Dentition.—

1. Frequent hot irrigation of the mouth with a solution of the following:

℞ Chloralis hydratis . . . grs. xlviii
Aq. menth. pip. . . . ℥i.
M. Sig. One teaspoonful to 3 ounces of hot water for irrigation.

2. Gentle friction of the gums with the following mixture.

℞ Chloroformi . . . . . *m.* vii
Creosoti pur. . . . . *m.* iii
Vini opii . . . . . *m.* ii
Tinct. benzoini . . . . . ʒiii.
M. Sig. External use.

—*Danchez.*

Prophylactic Treatment of Hereditary Syphilis.—PINARD prescribes one of the following formulæ which, according to his observation, never cause digestive disturbances and only seldom a slight coryza. The treatment is carried out during the whole course of pregnancy.

℞ Hydrarg. iodidi rubri . . . gr. i
Potass. iodidi . . . . . ʒiss
Syr. simpl. . . . . ℥vi.
M. Sig. One tablespoonful twice a day at mealtime.

℞ Hydrarg. iodidi rubri . . . gr. i
Potass. iodidi . . . . . ʒiss
Aq. menth. pip. . . . . ʒiii
Aq. dest. . . . . ℥v.
M. Sig. One tablespoonful twice a day at mealtime.

For Blepharitis.—FAGE highly recommends bathing the affected surfaces every other day with a watery solution of picric acid (5 or 10 parts to 1000), or with this solution mixed in equal parts with glycerin to render it more adherent. The action is antiseptic, analgesic, and non-irritating.

For Seborrhea of Scalp with Beginning Alopecia.—BAYET advises that the following procedure be carried out daily or once or twice weekly according to the severity of the case. (1) Wash scalp with tar soap for ten minutes. (2) After rinsing, wash scalp with one-half-per-cent. solution of corrosive sublimate in hot water. (3) Dry scalp, and rub into it a five-per-cent. naphthol pomade, removing any excess of the same.